SuperSystems incorporated

MGA
Operations Manual

Please read, understand, and follow these instructions before operating this equipment. Super Systems, Inc. is not responsible for damages incurred due to a failure to comply with these instructions. If at any time there are questions regarding the proper use of this analyzer, please contact us at (800) 666-4330 for assistance.

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The MGA6010 is a Non-Dispersive Infra-Red (NDIR) gas analyzer designed for continuous operation.

Unpacking

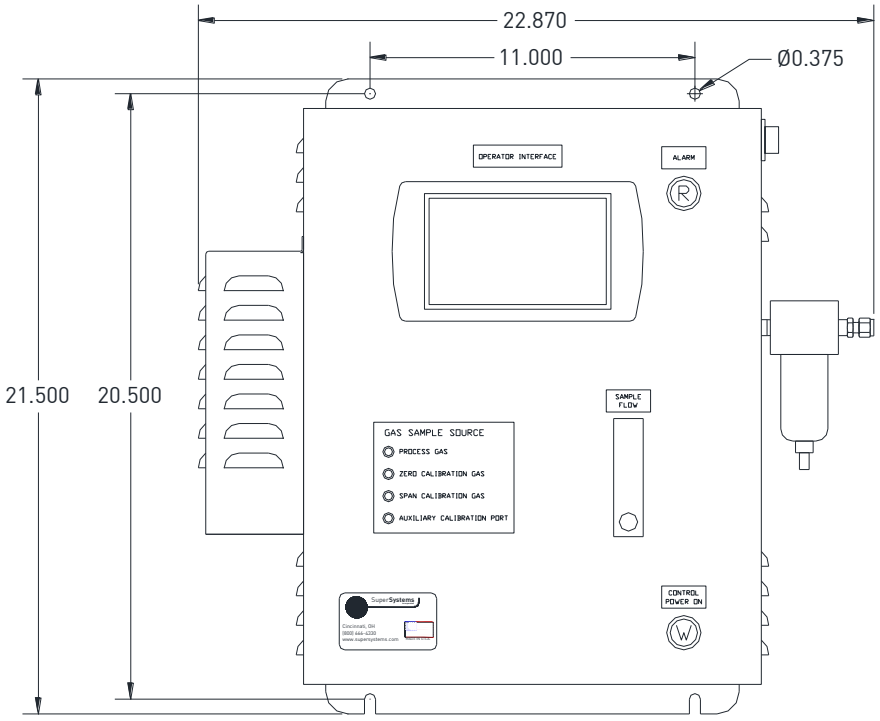
The following items should be included in the box:
(1)MGA6010 Gas Analyzer
(1)Bowl Filter Assembly (attach to "Sample Inlet" port)
(1)¼" Male NPT to 3/16" barb fitting (attach to "Aux. Cal. Gas Inlet" if desired)
(1)Operations Manual
(1)XGA Viewer CD
(2) ¼" Male NPT to calibration gas inlet hose fitting (attach to "Zero and Span Cal. Gas Inlet" if desired)

If any of these items is missing or damaged please contact Super Systems Inc. at (800) 666-4330.

Mechanical Installation

Enclosure Mounting

It is recommended that the MGA6010 be mounted as close to the sampling point as possible, since that will reduce the length of the plumbing lines that will need to be maintained. It is intended for use in a heat treating environment, but care should be taken not to mount it too close to a furnace or other heat source. The operating temperature of the enclosure should be maintained below 122°F (50°C). If necessary, a heat shield can be mounted behind the enclosure to reduce the amount of radiant heat that the MGA is exposed to. In most cases, this will not be necessary. The mounting and overall dimensions for the enclosure are shown below.



The enclosure is heavily vented to prevent the buildup of potentially harmful gases in the unlikely event of an internal leak. This venting will also reduce the internal temperature by allowing the free flow of ambient air around the internal components.

Plumbing Connections

There are five plumbing connections on the MGA 6010:

- Sample Inlet – The incoming gas to be sampled should be routed through this port after passing through the included bowl filter.

- Sample Vent – After sampling, the gas will exit the enclosure through this port. Due to the potentially harmful nature of the gas being measured, the gas should be vented to a place in accordance with local regulations and safety standards.
- Zero and Span Calibration Gas Inlets – These are ¼" NPT female ports for connecting to calibration gases. For more information on acceptable calibration gases see the "Calibration" section of this manual. The incoming pressure of the gas will need to be adjusted to allow the flow to be the same for the calibration gas and the sample gas flow rate. The incoming pressurized gas goes through a small fixed orifice inside the analyzer, which should require between 20 and 50 psi to maintain proper flow. These ports are used with the automatic calibration system to provide calibrations at predetermined intervals or events. The use of these ports is not required for the operation of the MGA6010.
- Auxiliary Calibration Gas Inlet – This ¼" NPT female port provides another entry point for both zero and span calibration gases. If calibrations are being performed manually, this port should be used for both gases.

The flow of gas through the MGA6010 is controlled by solenoid valves. Each valve is normally closed, and for safety purposes all valves will shut to prevent unwanted furnace gases from entering the instrument when power to the enclosure is lost or the specified sampling parameters are not met.

Appendix B shows the plumbing connections.

Wiring Connections

Terminal blocks inside the instrument are available for the following purposes:

- Incoming line voltage (110-220 VAC)
- RS485 Communications
- 4-20mA Outputs
- Alarms
- Digital Inputs

Each terminal block is numbered according to the included electrical drawing. Knockout holes in the enclosure have been provided to simplify wiring connections. Knockouts are located on the right side and bottom of the enclosure. Additional or alternate locations can be added as needed. Please note that due to the potential for electrical interference, it is recommended that communication wires not be run in parallel to AC power wires.

The right side of the enclosure also contains two Ethernet ports, one USB A port and one USB B port. These can be used to communicate to the MGA6010. For

detailed information on the use of these ports, please see the section of this manual titled Communications Setup.

Appendix A shows the wiring connections.

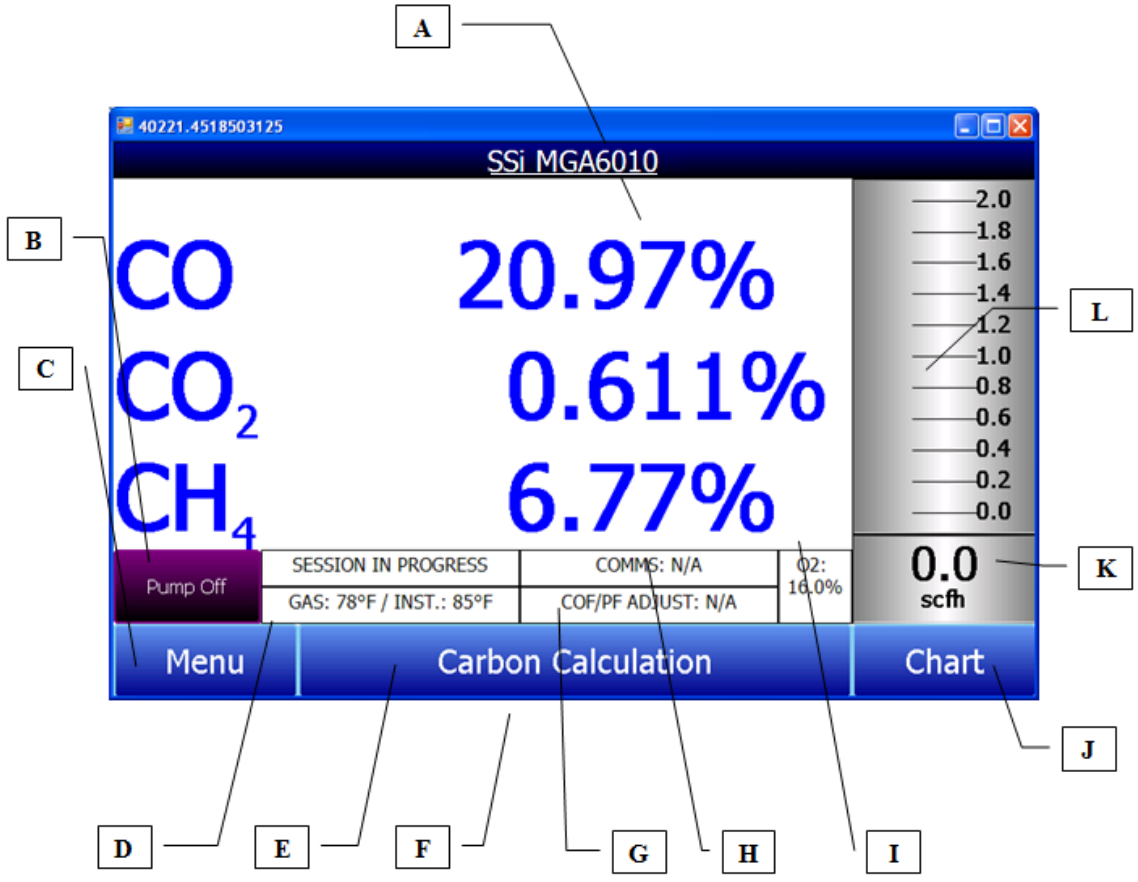
Recommended Spare Parts:

PART NUMBER	DESCRIPTION
37051	Bowl Filter Element
20264	Ceramic Lined Sample Tubing Assembly with High Temperature Filter
13504	Span Gas Blend, 90 cubic feet, including cylinder and regulator assembly
13505	Zero Gas (Nitrogen), 90 cubic feet, including cylinder and regulator assembly
32126	Relay, SPDT
37198	Sample solenoid (Stainless Steel)
37199	Calibration gas blocking solenoid (Brass)
20623	IR Sensor
20624	H2 Sensor
31603	Spud circuit board
31548	Quad 4-20mA analog output circuit board
13550	Color touch screen
31295	Touch Screen Stylus
31135	24VDC power supply
37177	Sample Pump, 110VAC
37177.22	Sample Pump, 220VAC

Basic Operating Description

The Model MGA6010 has been designed for the simultaneous analysis of CO, CO_2 and CH_4 in heat-treat furnace atmosphere gases. It uses a color touch screen display / operator interface for data entry and for viewing. Selections can be made on the screen using a finger or a stylus. Do not use objects such as screwdriver tips or ink pens on the screen since they can potentially cause permanent damage.
When the instrument is powered on, it will take approximately 30 seconds for the MGA6010 software to automatically load. After that the instrument is ready to use. When the power switch is turned off, the instrument initiates a controlled shutdown procedure which takes about 15 seconds. After the controlled shutdown period, the instrument will completely turn off.

When the power switch is turned on, the MGA6010 will initiate the startup procedure. When finished, the main screen will be displayed:



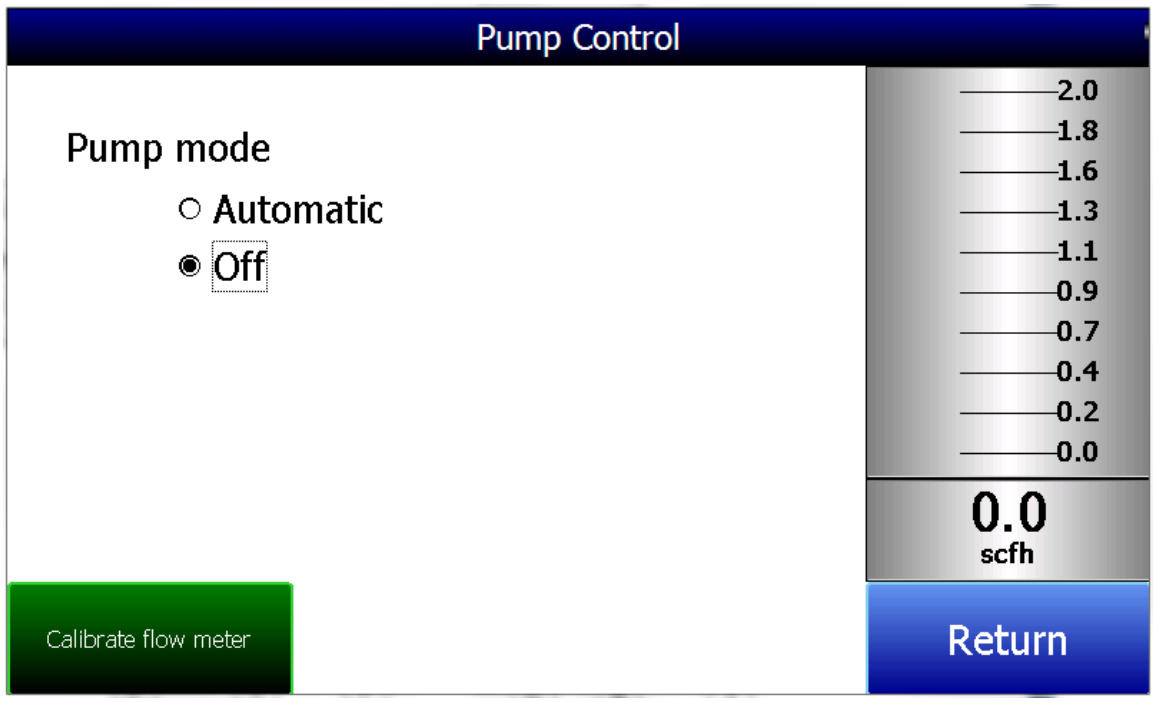
A – Measured values of CO, CO_2, and CH_4
B – Pump status indicator / Button for change pump status
C – Button to access menu list
D – Session status indicator
E – Temperature / Instrument Temperature indicator
F – Button to Carbon Calculation screen

G – Automatic Carbon Calculation Adjustment indicator
H – External instrument Communications status indicator
I – Measured value of Oxygen
J – Button for Trend Chart screen
K – Numeric flow indicator
L – Visual Flow indicator

This screen is the default screen for the MGA6010. This screen can be accessed from any other screen by pressing the "go back" or "Return" button at the bottom right of any screen. Depending on the screen, it may be necessary to press this button more than once.

Pump Operation

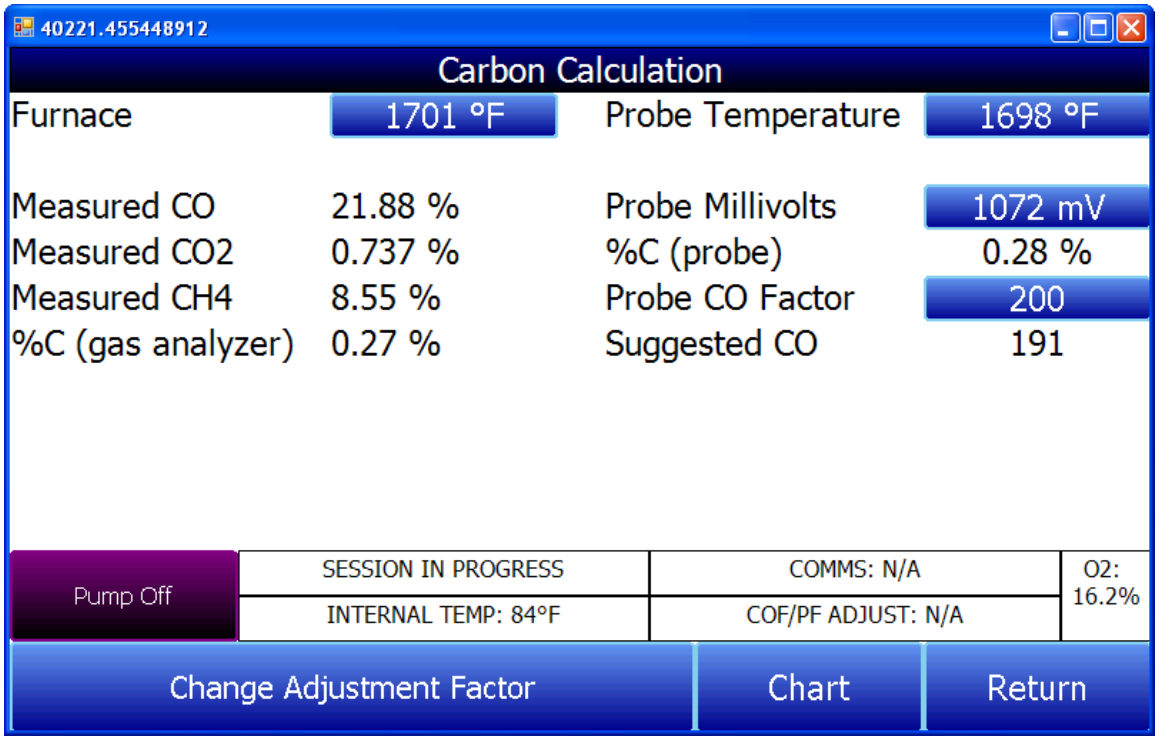
On startup, the pump will be off. When sampling an endothermic generator or any other gas under positive pressure, the pump should remain off. For proper operation, there should be between 1.0 and 2.0 SCFH of gas flowing through the sensors. If the flow meter at the right of the screen or on the inside of the lid does not indicate sufficient flow, the pump should be turned on. When accessed from the main screen, the pump has two possible modes, Automatic and Off.



Carbon Calculation

The MGA6010 measures the percent carbon in the measured gas by using the percentages of CO, CO_2, and CH_4, in addition to the Furnace Temperature that must be entered by the user. It is also possible to determine the percent carbon of the gas as measured by the Oxygen probe by entering the Probe Temperature, Probe Millivolts, and the Probe CO Factor. It is not necessary to enter the information from the probe to determine the percent carbon as measured by the gas analyzer. Entering the probe information does allow for a comparison to be made between the percent carbon as measured by the Gas Analyzer and by the Oxygen Probe. The MGA6010 will

then be able to suggest a change to the probe CO Factor (or Process Factor depending on the manufacturer) that will allow the probe to measure the same carbon level as the gas analyzer.



Measurement of the percent carbon using infra-red analysis is generally considered to be a superior method to determining the percent carbon when compared to an Oxygen Probe alone. This is because the Oxygen Probe is measuring the amount of Oxygen in the gas, and then inferring the percent carbon by assuming a theoretical mixture of endothermic gas. Instead of inferring this mixture, the gas analyzer will measure the exact composition of the gas to determine the percent carbon.

Chart

The Chart Display shows between 1 hour and 24 hours of process variable data on the screen and can be scrolled back to view all of the data stored on the hard drive. The vertical timelines change as the time changes on the screen.

The function buttons run along the bottom of the screen.

The Trend Lines button - - will allow the user to select or de-select the trend lines on the trend chart to display. If the checkbox next to each trend line is checked, then that trend line will be displayed.

The Datagrid View button - - will display a screen with the trend data in a grid format instead of with trend lines. The trend data is shown in 1-minute intervals. Clicking on the **OK** button on this screen will close the screen down and return to the Chart Display screen.

The Refresh button - - will refresh the screen's trend data if the screen is not in real-time mode.

The left green arrow button - - will move the chart's view backward in time by the specified chart interval.

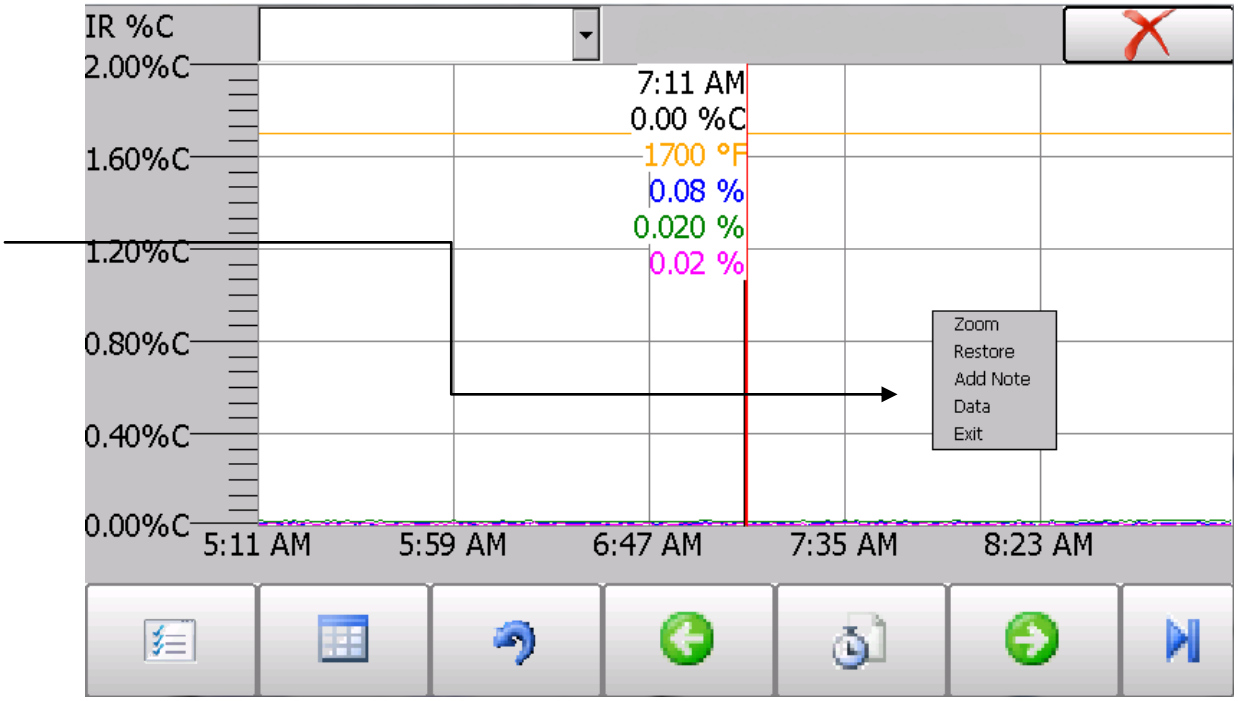
The chart interval button - - will determine the number of hours displayed on the trend chart. The options are: **1 Hour**, **2 Hours**, **4 Hours**, **8 Hours**, **12 Hours**, or **24 Hours**.

The right green arrow button - - will move the chart's view forward in time by the specified chart interval.

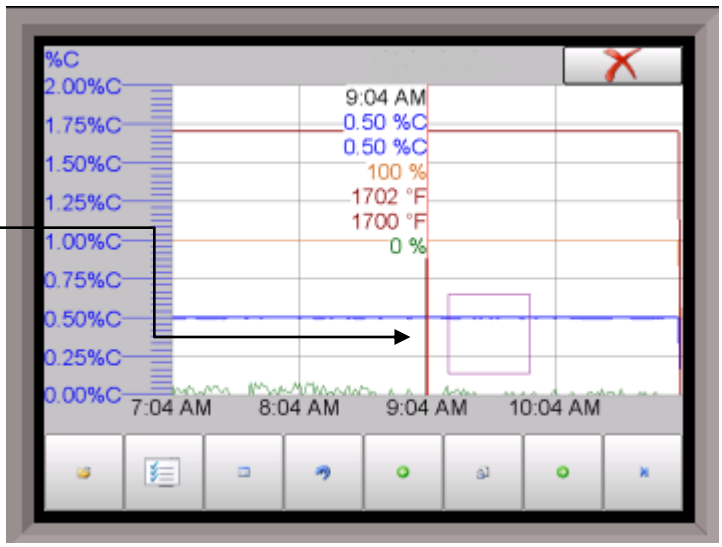
The blue arrow button - - will toggle real-time mode on and off. When in real-time mode, the chart will automatically be updated once a minute.

Chart Sub Menu

There is a sub-menu available by putting a finger or a stylus anywhere on the chart and holding it there for a couple of seconds. The sub-menu will have the following options available: **Zoom**, **Restore**, **Add Note**, **Data**, and **Exit**.



The **Zoom** option will allow the user to zoom in on a particular part of the screen. Once this has been selected, the user can take a stylus or a finger and create a box around the desired data. Once the user releases the stylus or finger, a zoom is no longer possible, and the user will need to re-select the option from the sub-menu to zoom in again.



The **Restore** option will back out of any zoom options that have been performed and display the chart screen as it initially was.

The **Add Note** option allows the operator to enter a note on the chart, similar to writing on a paper chart. The note shows up when the chart is printed out using the utility software included with the Series 9010 instrumentation. Pressing the **Add Note** option displays a screen where the operator can enter the operator ID or initials and a note. The user has the option to enter a note using the operator interface keyboard, where he or she will be able to type in the note; or the user can use the Signature mode, which will allow them to write a note using a stylus.

The **Data** option will show the trend data as a data grid instead of the trend lines on a chart.

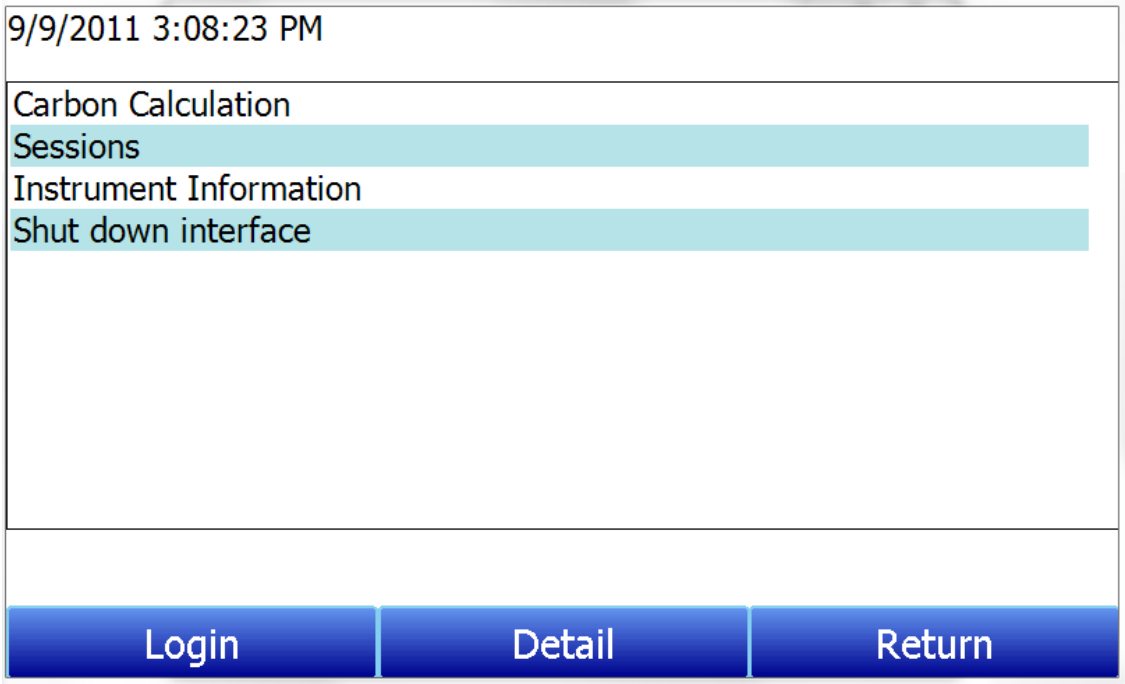
This functionality is exactly the same as if the user pressed the Datagrid View button - - from the chart screen.

Exit will close out the sub-menu without selecting an item.

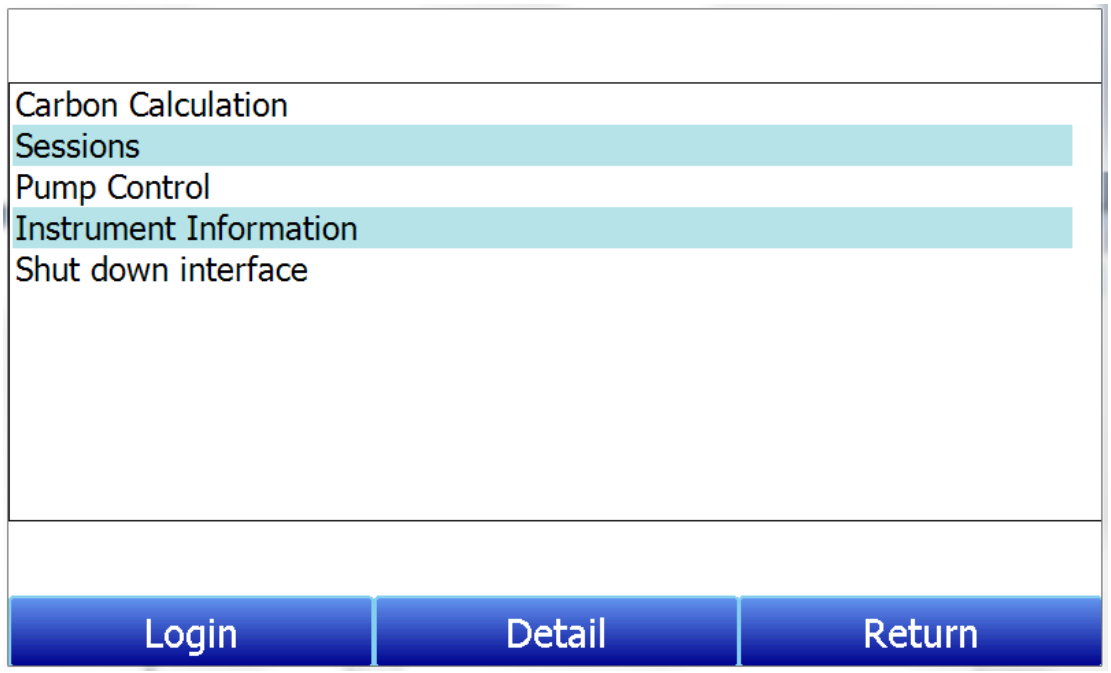
Pressing the red 'X' in the top right-hand corner of the screen will take the user back to the status screen.

Menu Lists

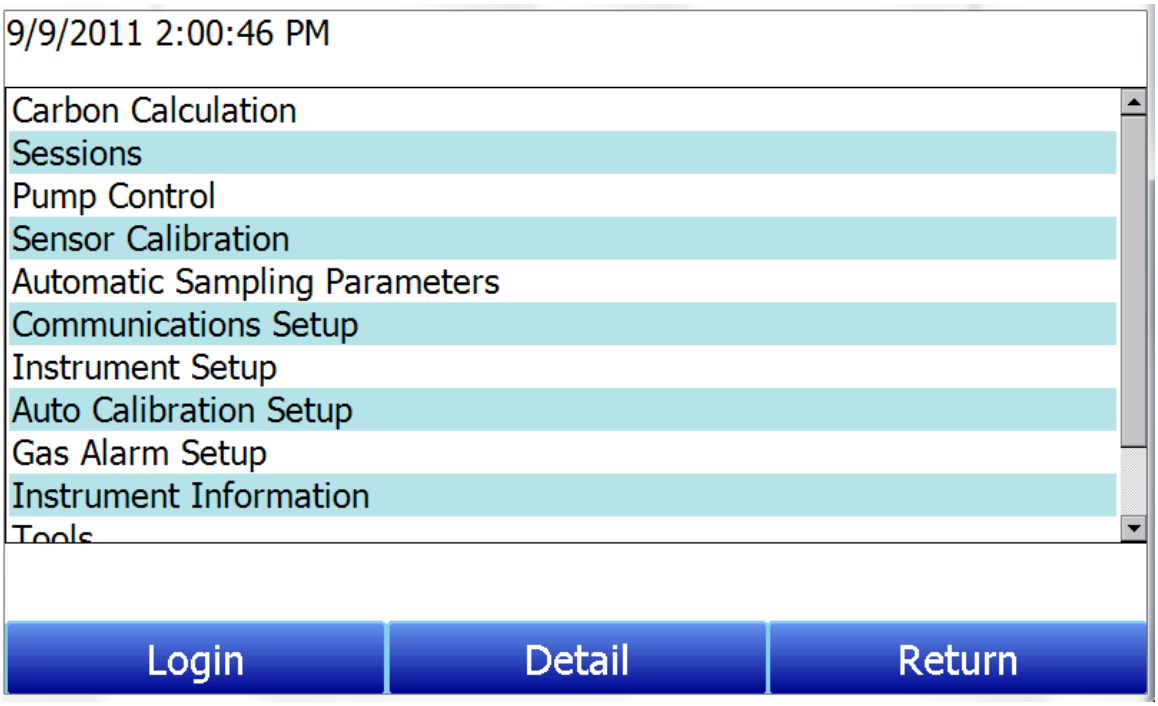
Accessing the menu screen will show four available options.



Carbon Calculation, Sessions, Instrument Information, and Shut Down Interface can be accessed by any users. Additional menu items are available when an authorized user logs in using an appropriate Pass Code. When the Supervisor Pass Code is entered (default = 1), the user will also be able to access the Pump Control screen.



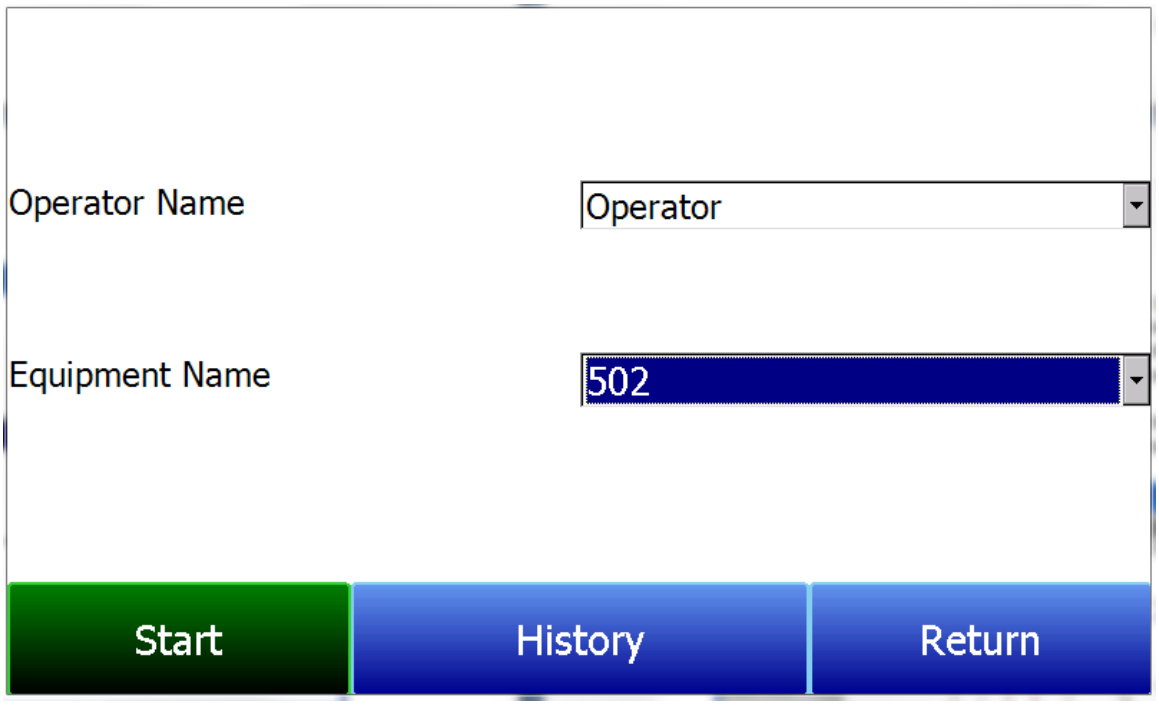
To see the full range of options available, the user must use the Configuration Pass Code (Default = 2). This provides the user with all available options including calibration and setup functions.



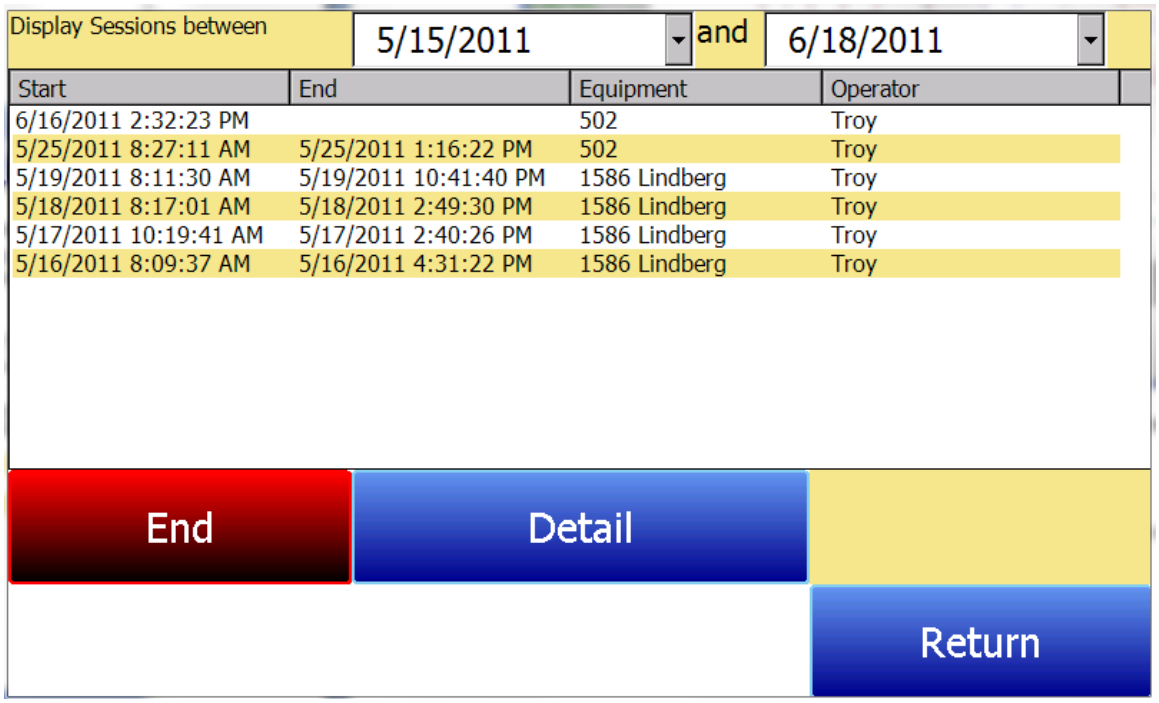
To access any items on the menu list, touch the item to highlight it and then press Detail. A specific description of each item on the list follows:

Sessions

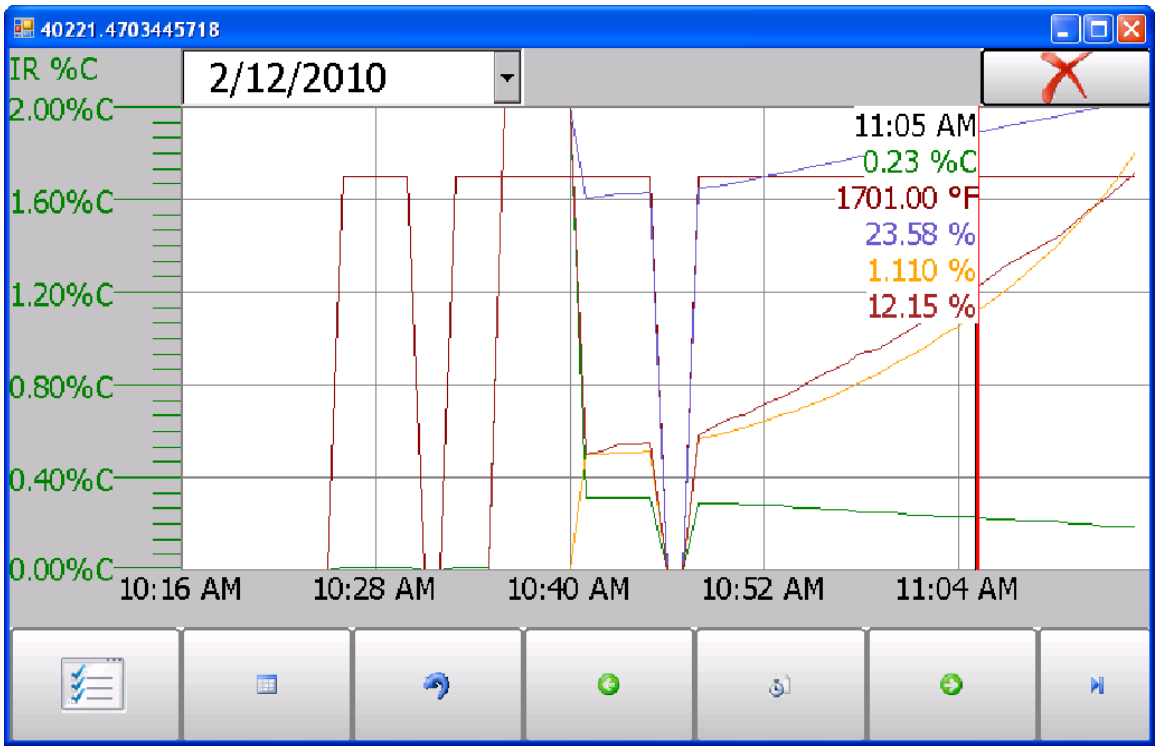
The instrument is logging data any time that it is powered on. This data can be viewed by entering the date and time of the data of interest. Identifying a sessions through the use of custom identifiers allows for a more user-friendly method of viewing and recalling data by allowing the user to apply tags to sections of data. These tags can include the name of the operator and the name of the equipment that is being measured.
The instrument has default values for each of these variables, but it is highly recommended that the selections be modified to reflect conditions at the specific facility where it will be used. This will allow for the data to be tagged in a way that is easily recognized by any member of your organization. For more information on how to set up these selections with custom entries, see the "Tools – Database Management" section of this manual.



Using the pull-down menus, select the User Name and Equipment Name from the list of available selections. Then begin the session by pressing Start. After confirming that you would like to begin a session, you will see a sessions summary screen. To end the session, press the red End button.



This screen will identify sessions between the date range specified at the top of the screen. As a default, sessions from the past 24 hours are shown. By expanding the data range, additional sessions can be seen. These sessions are sorted with the newest entry at the top, but they can be sorted by End Time, Equipment Name, or Operator Name by touching the header of each column.

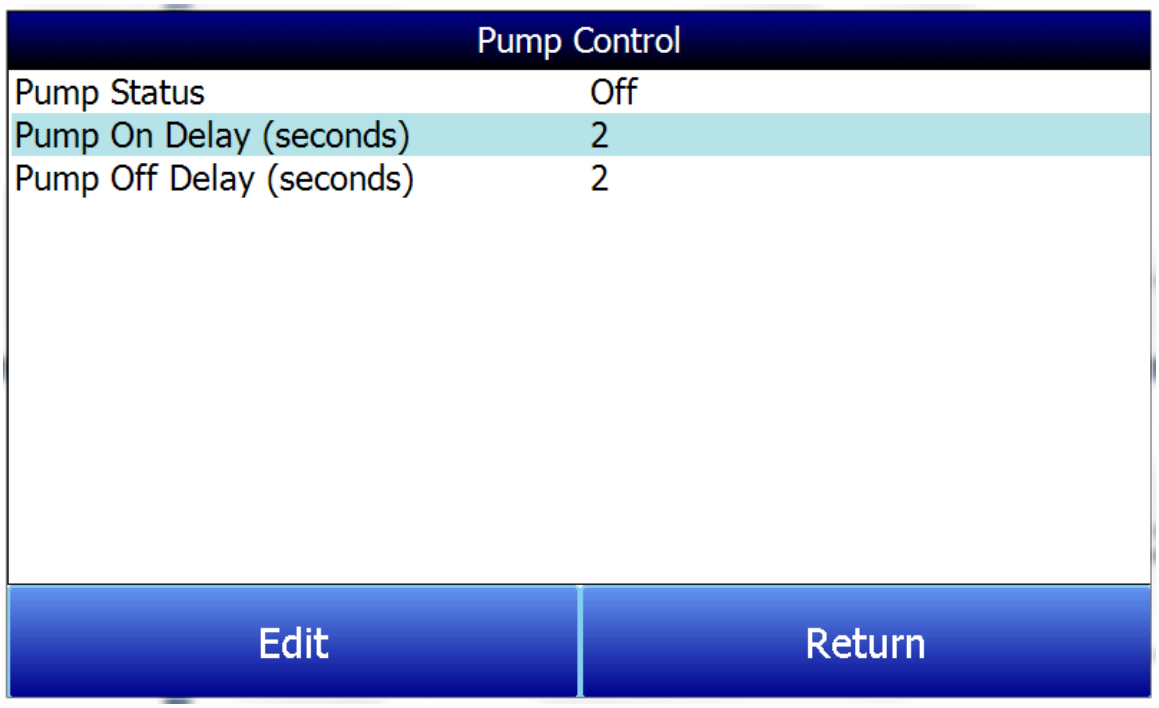


To see the details of any session, highlight it by touching it, and then press Detail. This will take you to a graphical representation of the data from the selected session.

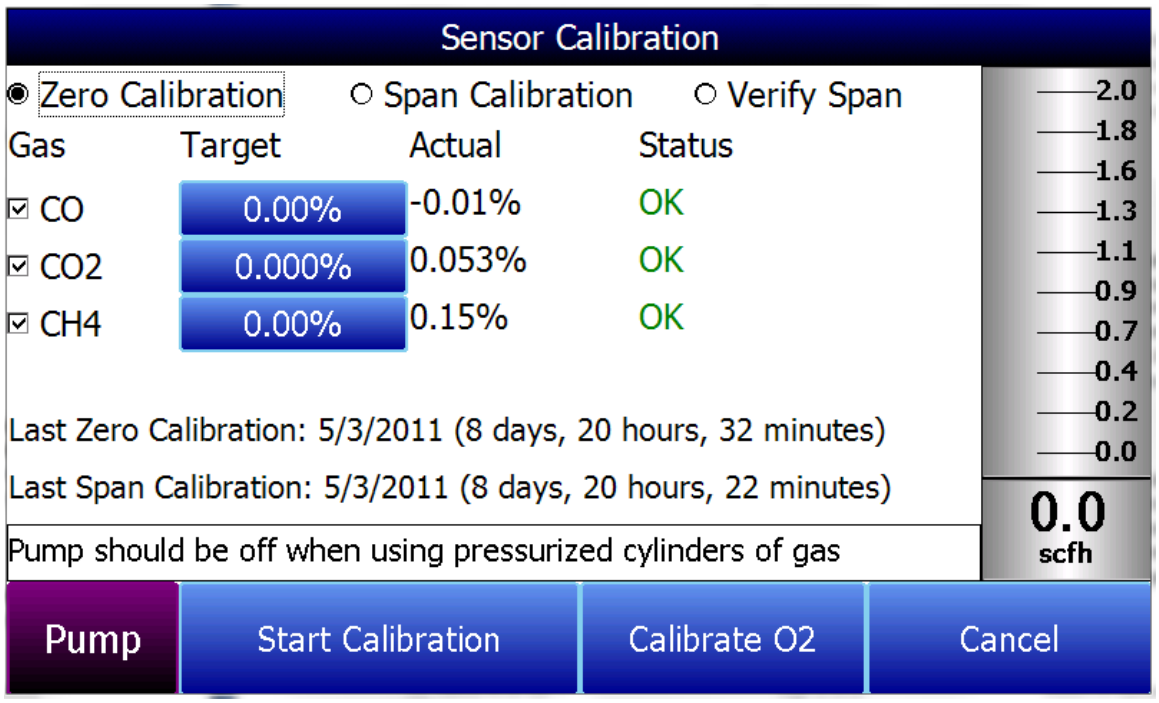
For more information on navigating the Chart Screen see the "Chart" section of this manual. To leave the Chart view, press the red X in the upper right hand corner of the screen.

Pump Control

The Pump Control screen will identify and allow the modification of the pump state (On or Off).



Sensor Calibration



Two types of calibrations can be performed on the NDIR sensor; Zero and Span. The Zero calibration should be performed with a gas that has none of the measured gases in it. Ideally this would be pure Nitrogen or Argon. The concentration of the Span calibration gas should closely resemble the gas that is being measured. For a heat treating application measuring endothermic gas, the ideal composition would be:

- CO: 20%
- CO_2: 0.5%
- CH_4: 5.0%
- H_2: 40%
- N_2: Balance

Since the accuracy of the calibration gas directly influences the resulting accuracy of the instrument, the highest possible accuracy grade should be obtained. Some gas suppliers refer to this as a "Certified Primary Standard". The high degree of accuracy is not required to obtain nominal values that exactly match the values shown above. The accuracy is required to know the exact composition of the gas in the cylinder. The actual composition will be shown on the bottle when it is delivered.

When flowing calibration gas into the analyzer, the pump should be off. The amount of flow from the gas cylinder should be approximately 1.5 SCFH at no pressure. The gas cylinders will be under high pressure, so it is recommended that a two stage regulator with a low pressure secondary stage should be used. It is good practice to begin the flow of gas before attaching the calibration gas to the instrument. This will prevent any high pressure bursts from entering the instrument.

Calibration gases can be obtained from Super Systems, however they can also be obtained from any supplier of custom gases. When connecting gases to the automatic calibration ports, two-

stage regulators should be used, and the line pressure should be controlled at approximately 15psi. The flow rate of the calibration gas should be adjusted so the flow rate of the calibration gas matches the flow rate of the sample gas during normal operation. Increasing the pressure will increase the flow rate, while decreasing the pressure will decrease the flow rate. Adjustments should be made while the gas is flowing.

Performing a Zero Calibration

On the Sensor Calibration screen, be sure that the button at the upper right of the instrument is selecting Zero Calibration and not Span Calibration.

When this is selected, the target values will automatically go to zero. Begin the flow of gas at the appropriate rate, and allow the readings to come to equilibrium. This occurs when the actual values are not moving in a specific direction and they display only slight movements up and down. This should take approximately 45 seconds.
There is a column showing the Status of each gas. In this area the instrument is making a comparison between the Target value and the Actual value and providing feedback based on the amount of difference between the two. There are three possible words that can appear in this area:

"OK" – The gas is within 10% of where it is expected to be.
"OK?" – The gas is between 10% and 20% of where it is expected to be. This could indicate an issue with the calibration gas, so the calibration gas and the associated tubing should be checked and verified to be free from leaks or improper gas composition. This message does not necessarily indicate that there is a problem with the sensor or the calibration. It is meant only to have the operator make sure that the proper procedures are being followed.
"BAD" – The gas is more than 20% from where it is expected to be. The same items should be checked as described above. This message could indicate an issue with the sensor.

Regardless of the status of each of the gases, the instrument can be calibrated by waiting for the readings have stabilized and pressing Start Calibration. Timers will begin to count down, and when they reach zero the Actual values should be the same as the Target values (allowing for slight variations as a result of gas fluctuations).

Use of a CO_2 Scrubber for Zero Calibrations

If an appropriate Zero calibration gas is not available, the included CO_2 Scrubber can be used. Using the CO_2 scrubber involves removing the protective caps from the scrubber and attaching it to the inlet hose on the MGA. The pump should then be turned on. This will pull ambient air through the scrubber and into the analyzer. The scrubber is designed to remove CO_2 from ambient air. Since ambient air should not have any significant amount of CO or CH_4, but it does have some CO_2 in it, using the scrubber will result in the instrument measuring a gas with no CO, CO_2, or CH_4 which is the function of a good zero gas. Unfortunately, depending on the environment where the calibration is being performed, ambient air may contain trace amounts of CO and/or CH_4. Also, the scrubber uses an expendable media that loses its effectiveness after repeated uses. For these reasons, Super Systems Inc. recommends the use of Nitrogen or Argon instead of the scrubber whenever possible.

Always replace the caps on the CO_2 scrubber after use. If it is left exposed to ambient air, the media will lose it's effectiveness. The amount of time that the Scrubber is exposed to ambient air is directly related to it's effective life span. If the protective caps are replaced after each use, the scrubber will provide years of service.

Never mistake the scrubber for a particulate filter. Not only is it not designed for this purpose, but since it removes the CO_2 from the gas it will result in very inaccurate readings. For these reasons, it should never be used during a Span calibration.

Performing a Span Calibration

A Span calibration is performed the same way as the zero calibration with two small changes. First, the selector button at the top should be on Span Calibration instead of Zero Calibration. Second, the gas values for the specific cylinder of gas that is being used need to be entered into the Target values. This is done by pressing the blue box associated with each gas and entering the value as it is shown on the cylinder. For example, the nominal value for CO may be 20%, but your cylinder may actually have 19.967% CO. This is the value that should be entered as a target.

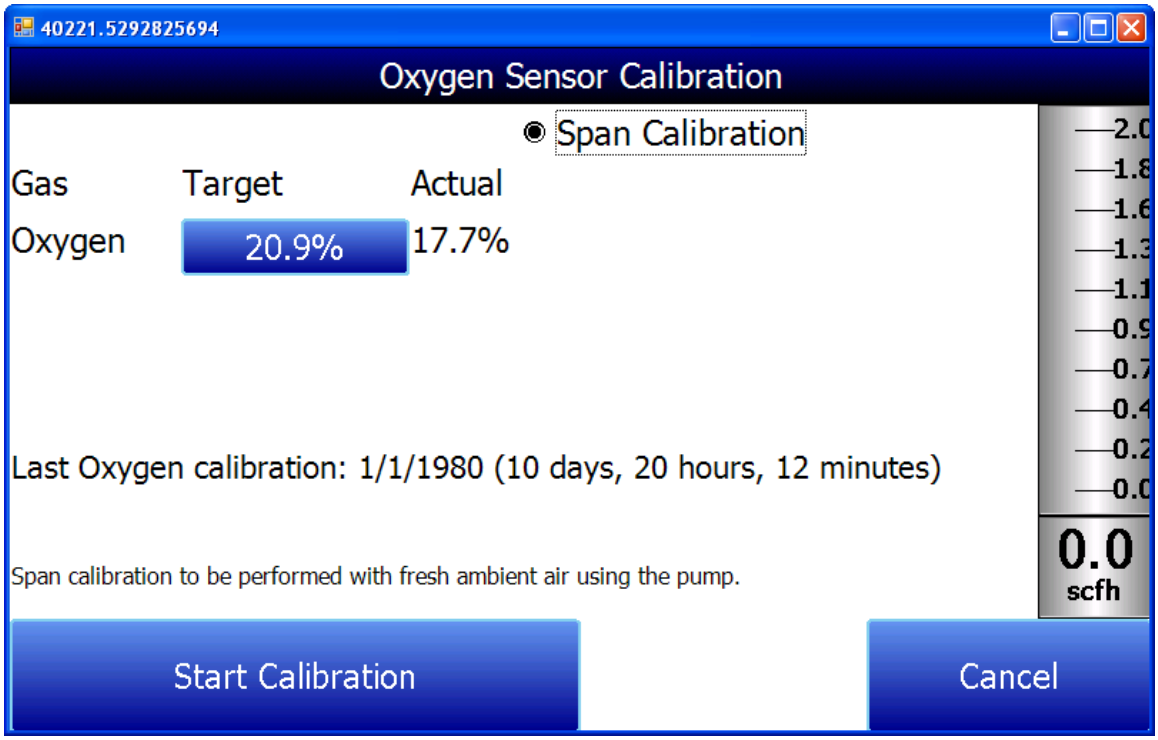
After the gas values have been entered, proceed with the calibration in the same manner as with the zero calibration.

Calibrating the Oxygen Sensor

The MGA6010 uses an electrochemical Oxygen sensor that should last approximately two years (depending on usage). It measures oxygen to a resolution of 0.1%, so it is not suitable for measuring trace amounts of Oxygen. Its intended use is for troubleshooting problems such as air and/or water leaks. The information from this sensor is not used in the calculation of percent carbon.

Calibration of the Oxygen sensor does not require a special calibration gas. Ambient air contains 20.9% O2, and since that concentration is relatively stable, it can be used to perform a span calibration on the sensor. There is no drift at the low range of the sensor so there is no Zero Calibration function for the Oxygen sensor. There is only a Span Calibration.

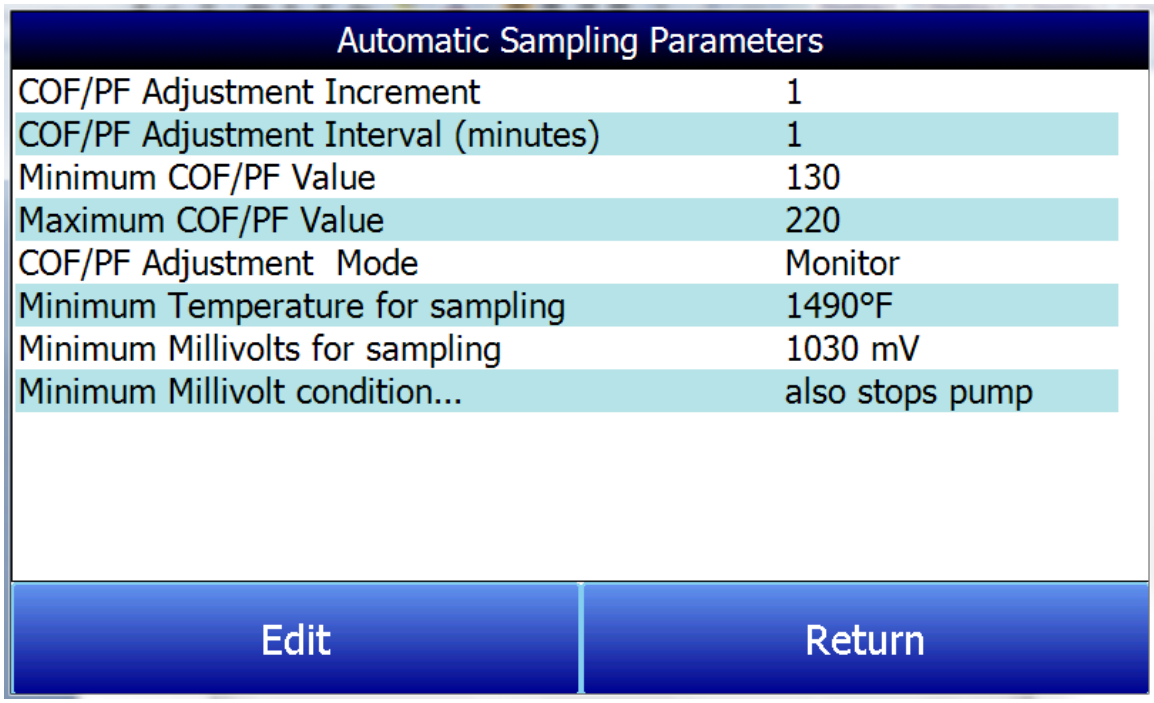
To perform a Span calibration, press the Calibrate O2 button on the Sensor Calibration screen. Bring the instrument to an office or outdoors where it will be in fresh air. When the Oxygen Calibration screen is entered, the pump automatically turns on. When the Actual value stabilizes, press the Start Calibration button. This will make the Actual value match the target value.



Automatic Sampling Parameters

This instrument is capable of communicating directly with a control instrument. This is valuable because it will provide real-time entry of the temperature and millivolt information from the probe, which will allow for an accurate comparison between the IR % Carbon and the Probe %Carbon. To establish this communications link, see Communications Setup – Set RS485 Communications.

The Automatic Sampling Parameters screen will allow the user to adjust the way that the MGA updates the COF / PF in the atmosphere controller. All of the parameters on this page can be disregarded if the "COF/PF Adjustment Mode" is set to "Monitor". These parameters only apply when the instrument is in Control mode.



COF/PF Adjustment Increment

When adjustments are made automatically, this value indicates the size of the step that is made when the COF/PF is changed. It is recommended that this number remain low to avoid making sudden changes to the process that could be caused by temporary conditions.

COF/PF Adjustment Interval (minutes)

This indicates the frequency that automatic adjustments are made. We recommend making small changes at a frequent interval instead of making large changes at longer intervals. This will prevent temporary changes in atmosphere from making dramatic adjustments to the COF/PF.

Minimum COF / PF Value

As a safeguard, the COF/PF can be prevented from dropping below a certain point. This point is the Minimum COF/PF value.

Maximum COF / PF Value

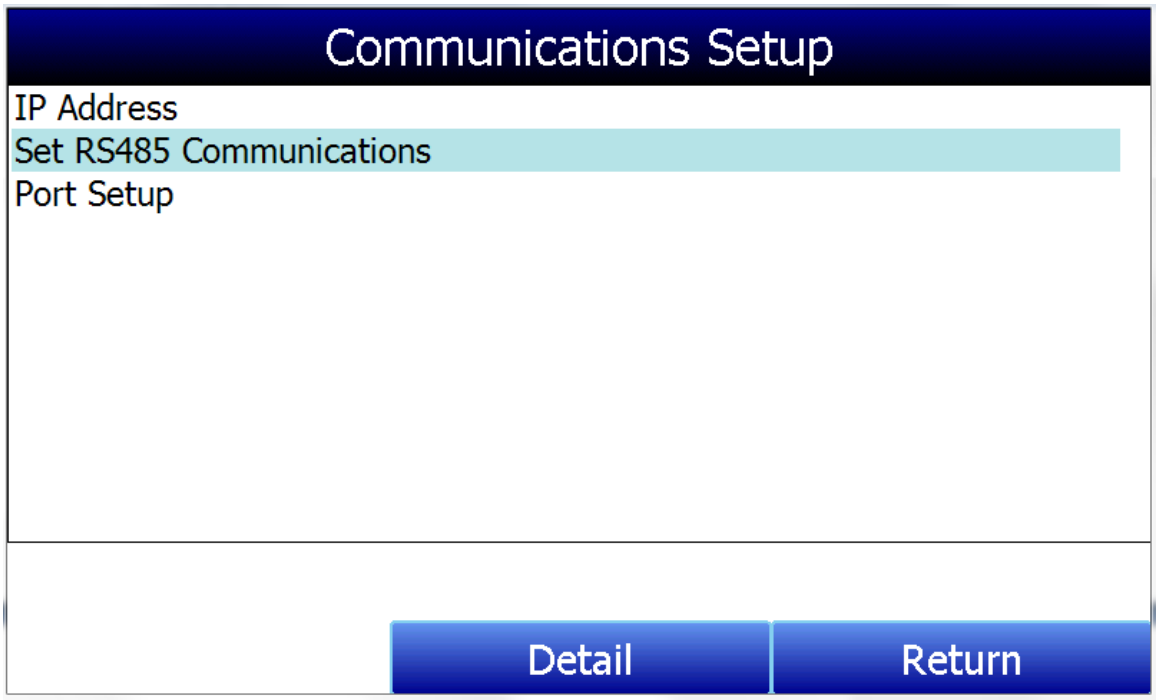
The Maximum COF/PF can also be entered as a safeguard.

COF / PF Adjustment Mode

This selection determines if changes to the COF/PF should be made automatically or if the instrument should only monitor the conditions and not make any changes. When in Monitor mode, a COF/PF will continue to be suggested, but no modifications will be made to the atmosphere controller.

Communications Setup

This screen allows the user to view and modify the method of communications between the instrument and external devices.

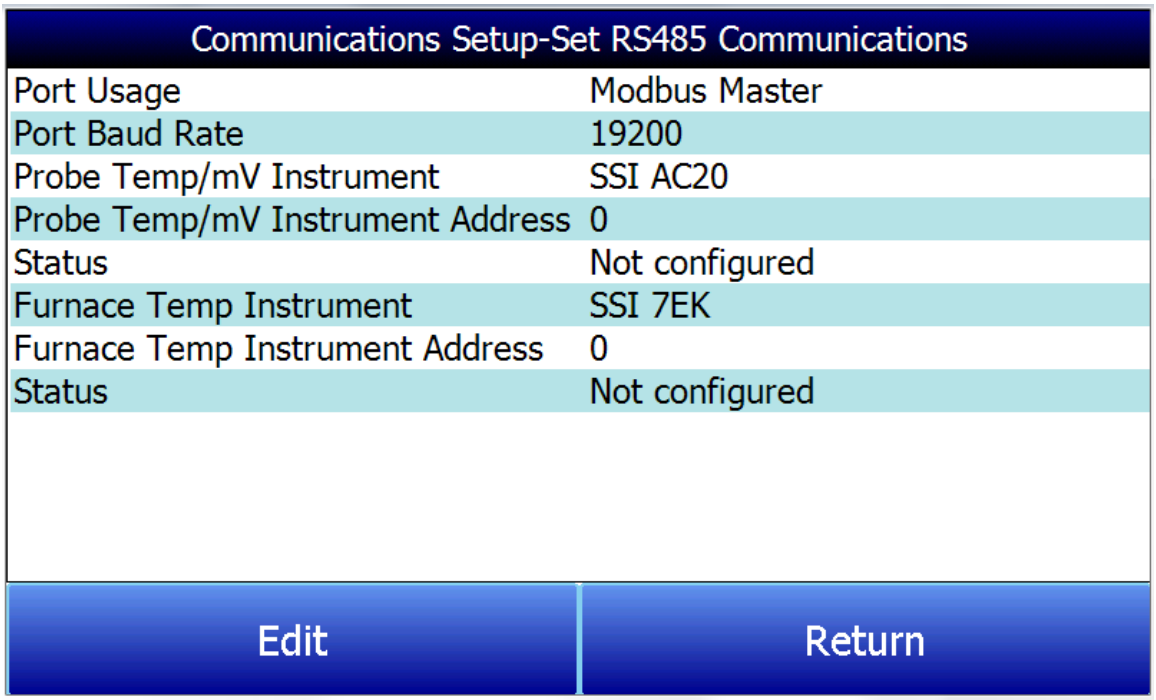


IP Address

This section identifies the IP Address of the instrument. When connected to a network, the MGA screen will obtain it's own IP Address. It does this during the power-up procedure, so if you are going to communicate via Ethernet plug the cable into the instrument before turning it on.

Set RS485 Communications

RS485 communications can be set up to automatically enter and update data from the oxygen probe and, if desired, make modifications to the COF/PF in the atmosphere controller.



Port Usage

This is the communication method used to supply information to the instrument. To change the port usage, enter a number between 0 and 2. The possible values are:
Modbus Master
Modbus Host

Port Baud Rate

This is the speed of communications which can range between 1200 and 115200.

Probe Temp/mV Instrument Type

This is the make and model of the device that will be supplying the instrument with information on: probe temperature, probe millivolts, and COF/PF. Possible choices are:

- SSi AC20
- Yokogawa UDP750
- Honeywell UDC3300
- Dualpro Loop 1 Modbus
- Dualpro Loop 2 Modbus
- SSI 9200 Loop 1

Probe Temp/mV Instrument Address

This is the address of the atmosphere controller. It can be directly entered using the numeric keypad on the touch screen.

Furnace Temp Instrument

This is the make and model of the device that will be supplying the instrument with information on furnace temperature. If there is no instrument associated with this input, the probe temperature will be used. Possible selections are:

- SSi AC20
- Yokogawa UDP750
- Honeywell UDC3300
- Dualpro Loop 1 Modbus
- Dualpro Loop 2 Modbus
- SSI 9200 Loop 1
- SSI 9200 Loop 2
- SSI 9200 Loop 3
- SSI 9100 Loop 1

Furnace Temp Instrument Address

This is the address of the furnace temperature instrument. It can be directly entered using the numeric keypad on the touch screen.

Probe Temp/mV Source Instrument

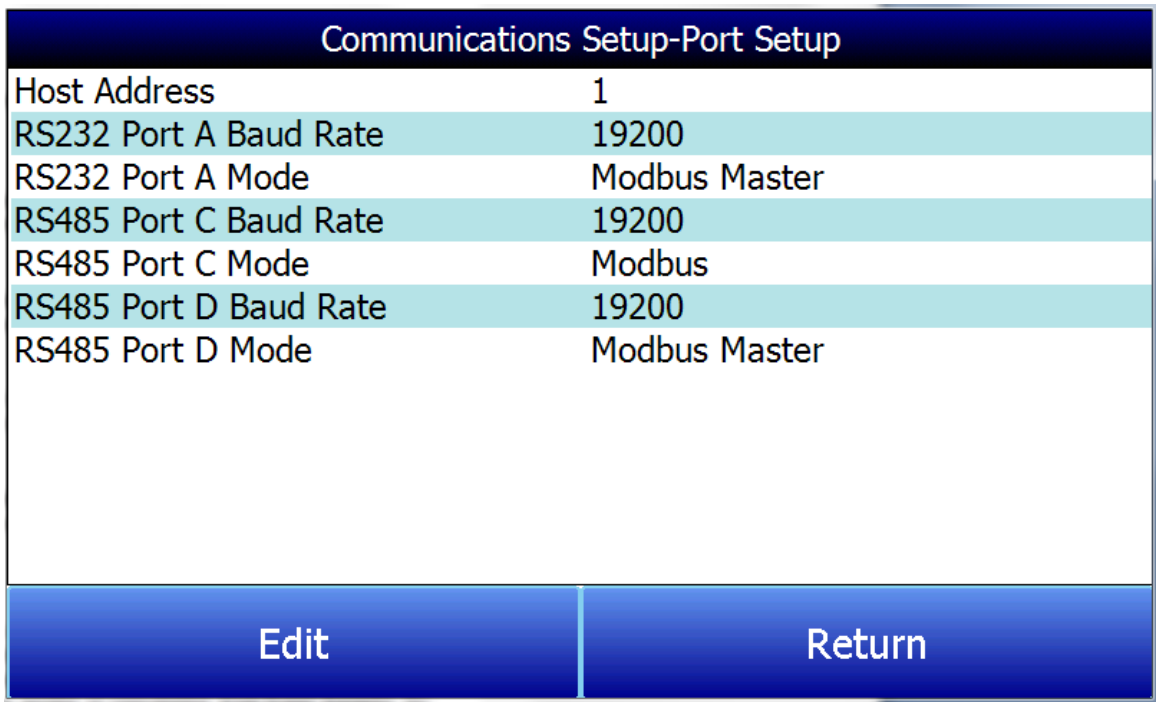
This line displays the status of communications with the Temperature / Millivolt instrument. The message is automatically generated and cannot be adjusted by the operator.

Furnace Temp Source Instrument

This line displays the status of communications with the Temperature / Millivolt instrument. The message is automatically generated and cannot be adjusted by the operator.

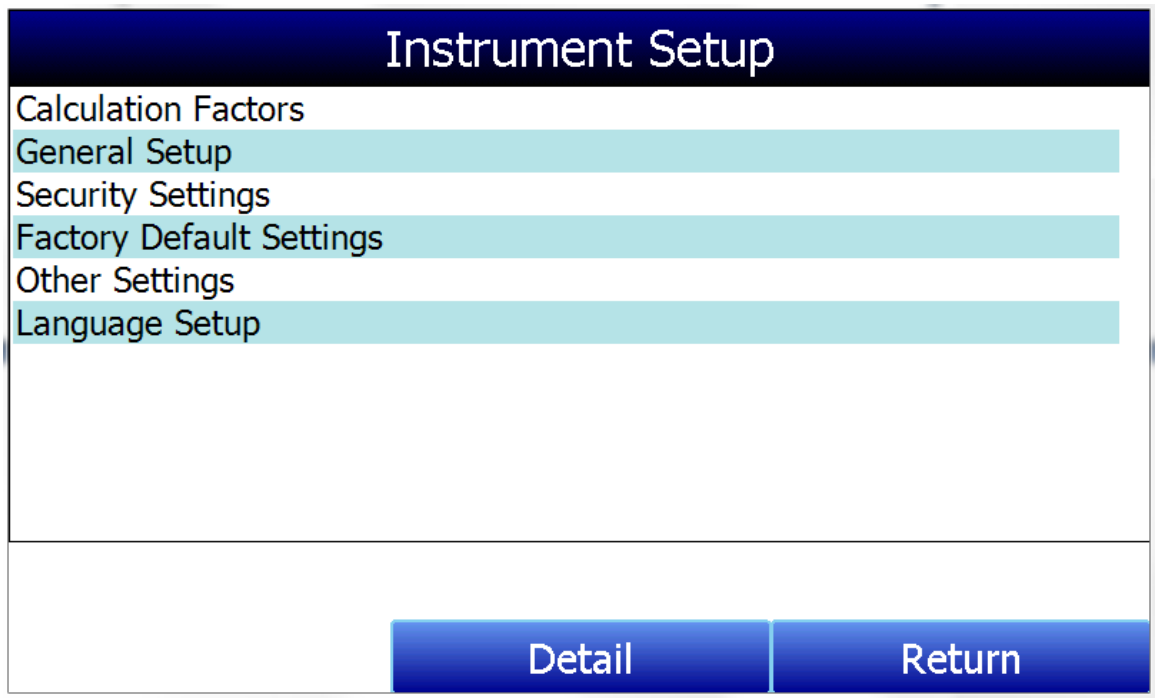
Port Setup

This page is used to set the parameters for the communications ports. The factory default settings are shown below, and they should not need to be changed by the operator.


Communications Setup-Port Setup
Host Address 1
RS232 Port A Baud Rate 19200
RS232 Port A Mode Modbus Master
RS485 Port C Baud Rate 19200
RS485 Port C Mode Modbus
RS485 Port D Baud Rate 19200
RS485 Port D Mode Modbus Master
Edit
Return

Instrument Setup

The items shown in this menu list are settings that should only need to be changed once. Any modifications to the default values will be saved in the instrument.



Calculation Factors

There are two items that will influence the calculation of carbon – the IR Shim Factor and the CH_4 Factor. These values should only be changed after determining that additional adjustments are required based on the specific conditions and equipment at your facility. Neither of these items should be modified without significant testing or consultation from Super Systems, Inc.

IR Shim Factor

Changing the IR Shim Factor is a way of modifying the computed percent carbon. The nominal value is 180. There is an inverse relationship between the IR Shim Factor and computed percent carbon. To increase the computed percent carbon this number should be lowered, and to decrease the computed percent carbon it should be increased.

CH_4 Factor

This factor increases or decreases the significance of CH_4 in the calculation of carbon. CH_4 does not have a significant impact on the computed percent carbon, so it has a minor role in the equation. If the measured gas has over 5% CH_4, it's role in the equation becomes greater than it should be. In these cases the CH_4 factor should be reduced. In cases where the CH_4 is present in excess of 7 or 8%, this factor can be reduced to zero.

General Setup

This screen shows the current time and date for the instrument, as well as the temperature scale. The temperature mode can be changed from this screen, but the time cannot be changed unless the MGA software is closed. Once the MGA software has been closed, double-click the time in the lower right corner of the screen and make the necessary modifications. Turning the power off and then on again will re-boot the MGA software with the updated time.

Security Settings

This page is used to change the pass code used for logging into the menu list. The default setting for the Supervisor Pass Code is 1, and the default setting for Configuration is 2. The maximum value for either code is 32767.
The Configuration Code will also work for all items on the Supervisor Pass Code items, so entering the Configuration Code (default =2) will give you access to all available menus.

Factory Default Settings

Selecting this option will cause the instrument to revert back to the settings that it contained when it came from the factory. Any changes or modifications made since then will be lost.

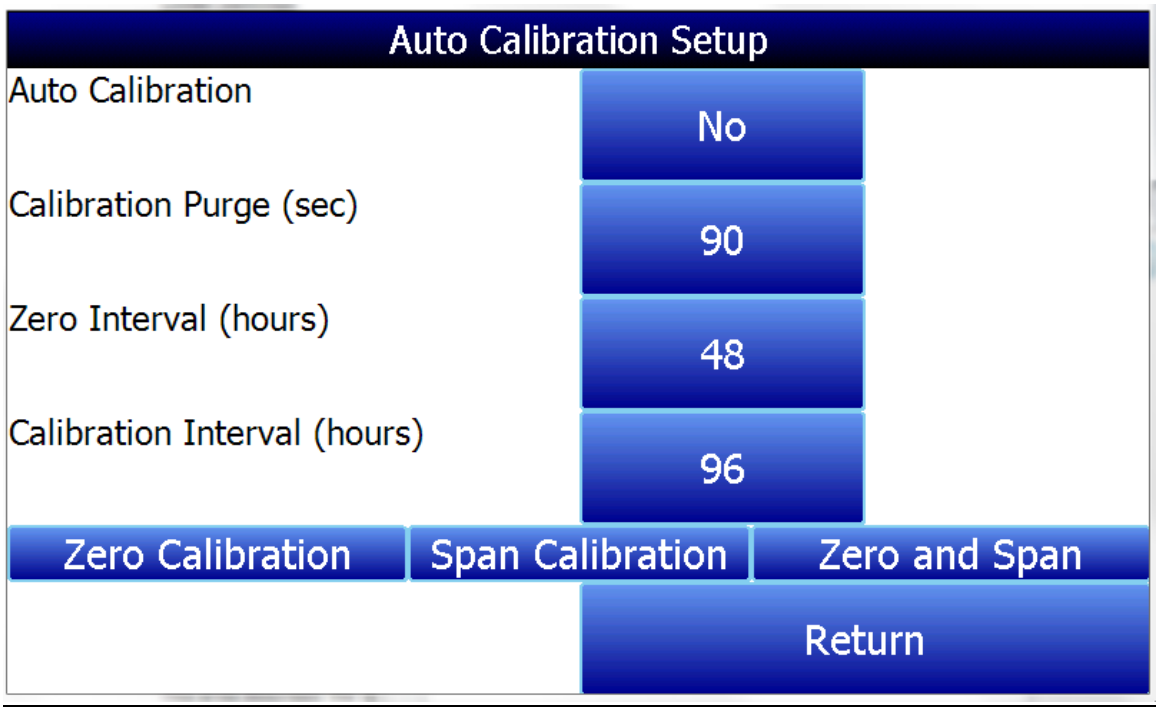
Other Settings

This screen allows the display of the calculated dew point. This value is not normally displayed because it is only accurate during certain conditions. Calculating dew point by using the gas values requires assumptions to be made regarding the composition of the gas being sampled, and since these assumptions are not always accurate the resulting dew point is not always accurate. When using Endothermic gas in a heat treating environment, the calculated dew point will usually be close to the correct value, but there is no substitute for a dew point that is determined through direct measurement of the moisture content of the gas.
When the dew point is enabled, it will appear near the bottom left of the Carbon Calculation screen.

Language Setup

The instrument language should be pre-configured at the factory prior to shipment, but they can also be changed by making a selection from the drop-down list.

Auto Calibration Setup



The automatic calibration feature allows the instrument to calibrate itself using external supplies of zero and span calibration gases at pre-determined intervals or events as dictated by the user. The first step when setting up the automatic calibration feature on the MGA6010 is to connect the Zero and Span calibration gases to the appropriate ports on the left side of the enclosure. There are blocking solenoids at each of these ports to only allow the flow of gas when it is called for and to prevent the flow when not needed. The pressure in the gas lines will need to be adjusted to maintain a flow rate similar to the sample flow rate, which should be between 20 and 50psi.

Method #1: Automatic calibrations based on timed intervals

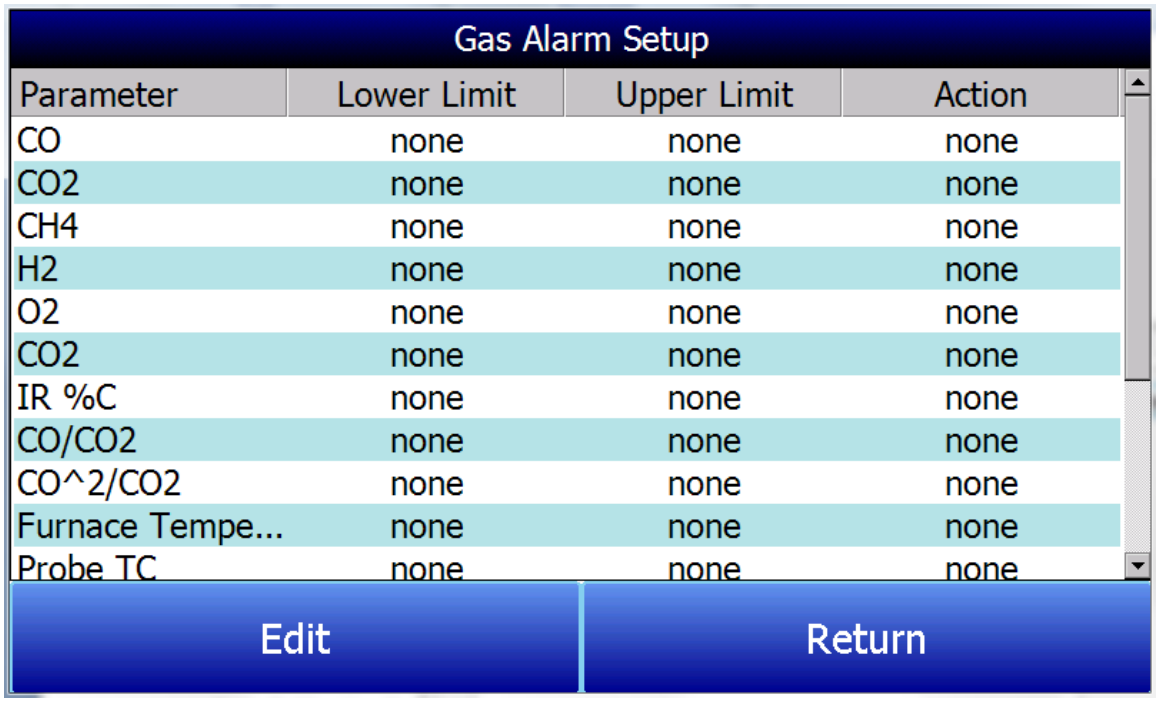
The interval between calibrations is determined on the Auto Calibration Setup screen. Auto Calibration must be set to "On". The calibration purge timer allows for the flow of calibration gas to purge the sample gas from the instrument before performing a calibration. If the sample lines are long the time can be increased from the default value of 90 seconds.
The zero and span intervals are measured in hours. The appropriate interval can be based on the process and the desired degree of accuracy. The standard values are 48 hours for a zero calibration and 96 hours for a span calibration.

Method #2: Automatic calibration based on digital inputs

It is also possible to initiate calibrations externally. This method may be beneficial if the calibration is to be tied in with a process event or as directed by a PLC. Connecting Terminals 2351 and the adjacent GND terminal will initiate an automatic Zero calibration. Connecting Terminals 2331 and the adjacent GND terminal will initiate an automatic Span calibration. Calibration can be initiated using the digital inputs regardless of the timed interval calibration setup. There are no setups required for the digital inputs since they are not user-configurable.

The three buttons at the bottom of the screen (Zero Calibration, Span Calibration, Zero and Span Calibration), can be used to initiate immediate calibrations from the Auto Calibration Setup screen. These buttons will not work unless the automatic calibration feature has been enabled.

Gas Alarm Setup



The MGA 6010 allows the user to configure various alarms. For each parameter, the Lower Limit, Upper Limit, and Action. As default, no alarms are enabled on the MGA unless a special request was made to do so at the time of ordering. To modify a parameter, select the item and press Edit. A screen will appear allow for the entry of the limits and the action. When any parameter is in an alarm state, a notification banner will show at the top of the screen identifying the alarm, and the red light on the door will illuminate. If desired, one of the two

relays (or both simultaneously) can be energized. There are four possible actions for the alarms:

- None – On screen notification of alarm condition. No relay actions.
- AL1 – On screen notification of alarm condition plus energizing of alarm relay #1.
- AL2 – On screen notification of alarm condition plus energizing of alarm relay #2.
- AL1 & AL2 – On screen notification of alarm condition plus energizing of alarm relays #1 and #2.

The relays provide a contact that can be connected to external lights, horns, or other devices as desired. The rating for these relay contacts is maximum of 6 Amps / 250 Volts.

Instrument Information

These items cannot be modified; they can only be viewed.

General Information

This is information on the revision levels of various components of the instrument. This can be valuable when consulting with the factory about issues with the instrument.

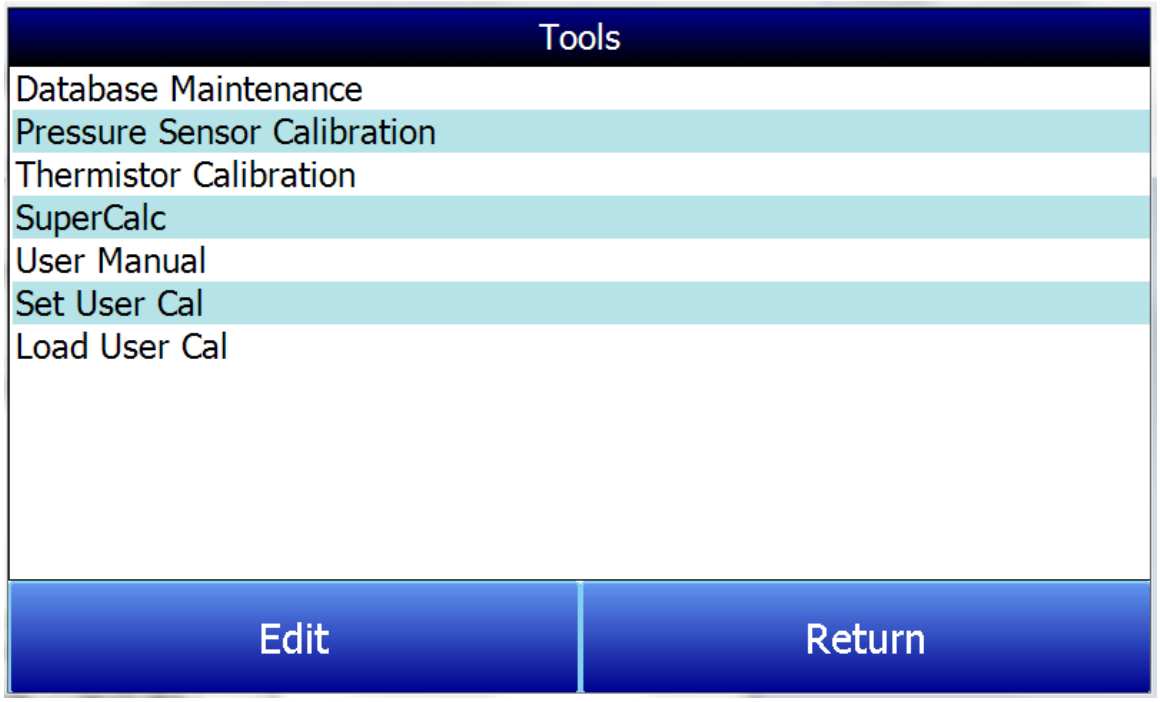
Calibration Dates

This area describes the last time the instrument was calibrated at the factory, plus any calibrations that have been performed since then. These dates and times are automatically computed and cannot be manually entered.

Power Status

This screen will identify the amount of voltage that is available to the instrument and also indicate if the instrument is being charged or not. When plugged in, the Internal Supply Voltage will show the amount of power coming from the internal power supply. When unplugged, the Internal Supply Voltage will indicate the battery voltage.

Tools



Database Maintenance

To make the information recorded during a Session more valuable, the Sessions database should be populated with relevant information regarding the people who will be using the instrument and the equipment that they will be working on. Taking the time to enter this information will provide additional fields to sort by after the data has been collected in a session.

Maintain Equipment Types

Many of the common types of heat treating equipment have been added into the MGA6010 as default entries. In the event that some of these items are not relevant, or if there are additional pieces of equipment that you would like to add to this list, this can be accomplished on this screen.

Maintain Equipment

Each organization has different names for the various pieces of equipment in their shop. Those names should be entered here. Each name needs to be associated with a specific Equipment Type, so that database should be populated first.

Maintain Sessions

The MGA6010 is designed to delete the oldest files first in the event that the storage capacity has been exceeded. It is also possible to delete old files manually by entering a date on this screen. All files that were made before that date would be permanently deleted. It is important to note that after the data has been downloaded to a computer, a copy is stored on that computer. The data will always be available on the computer even if it has been deleted from the screen.

Maintain Users

The names of all potential users can be entered here. Names can be added and deleted as required.

Compact Database

Periodic database compaction will help make data storage more efficient and allow more data to be stored before it is automatically deleted. Nothing is deleted or lost when this button is pressed, and the only result will be a performance improvement.

Pressure Sensor Calibration

The pressure it set at the factory for local conditions. For optimal performance, the ambient pressure should be reset at the final destination. This can be done by determining the barometric pressure and the elevation and entering them on this screen. After the two values have been entered, press the Calibrate button and the pressure sensor calibration will be complete.

Thermister Calibration

This will be set at the factory and should not need to be adjusted by the end user. It allows for the sample gas temperature and the ambient temperature inside the instrument to be set. This should only be performed after the instrument has been powered on long enough for it to achieve temperature equilibrium.

SuperCalc

SuperCalc is a proprietary software tool developed by SSI to allow the user to perform different scenarios and view the resulting percent carbon. It allows the user to enter gas percentages, probe information, and temperatures to see the effects of each variable on the calculated percent carbon. The data on this screen is independent of any values that are determined by the MGA6010, and it is only provided as a reference tool.

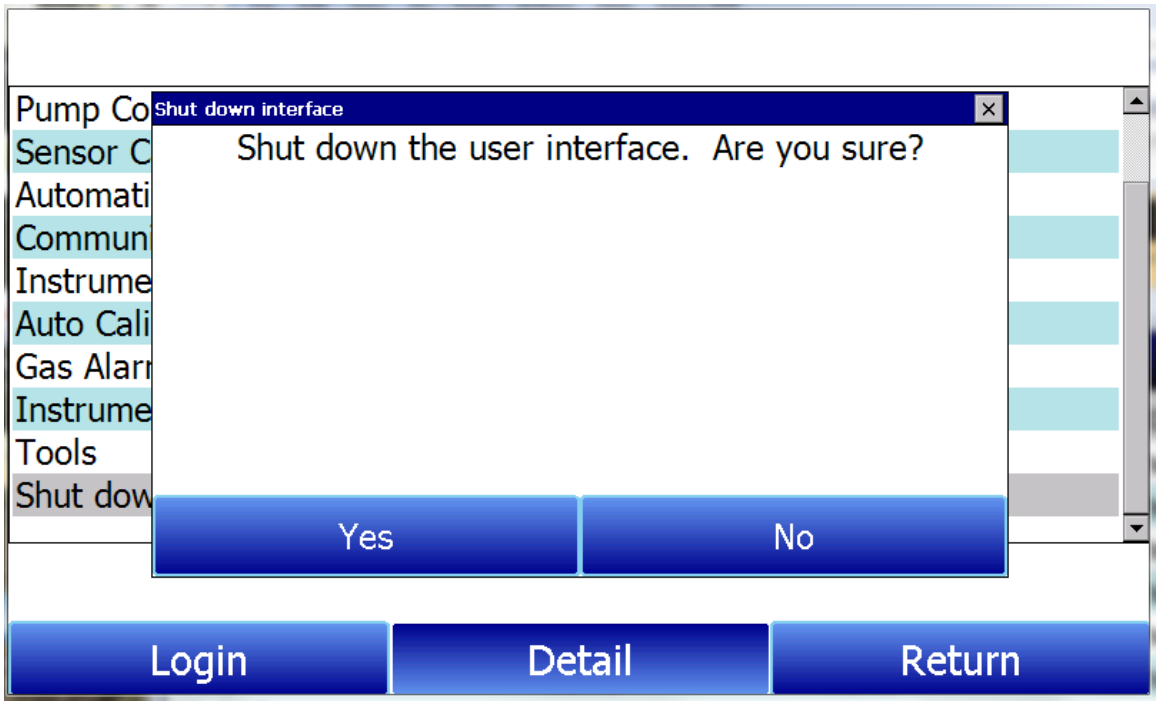
User Manual

An electronic version of the User Manual is located within the instrument for ease of reference.

Set User Cal / Load User Cal

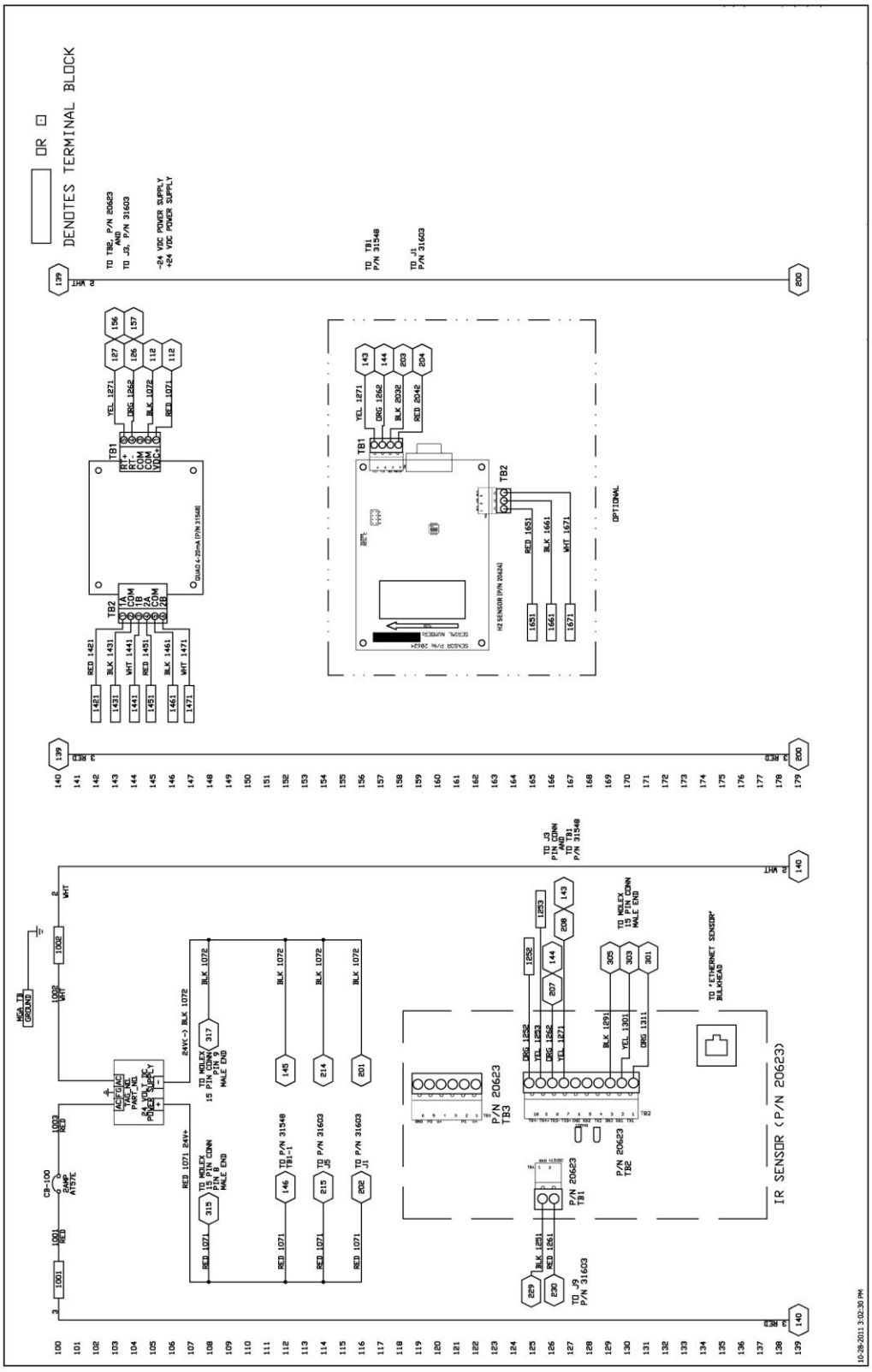
This feature allows the user to create new factory default calibration settings for the sensor. Instead of reverting to the factory calibration values, it can revert back to different calibration settings. This is accomplished by first setting the user calibration values. At any time after they are set, they can be restored by selecting Load User Cal.

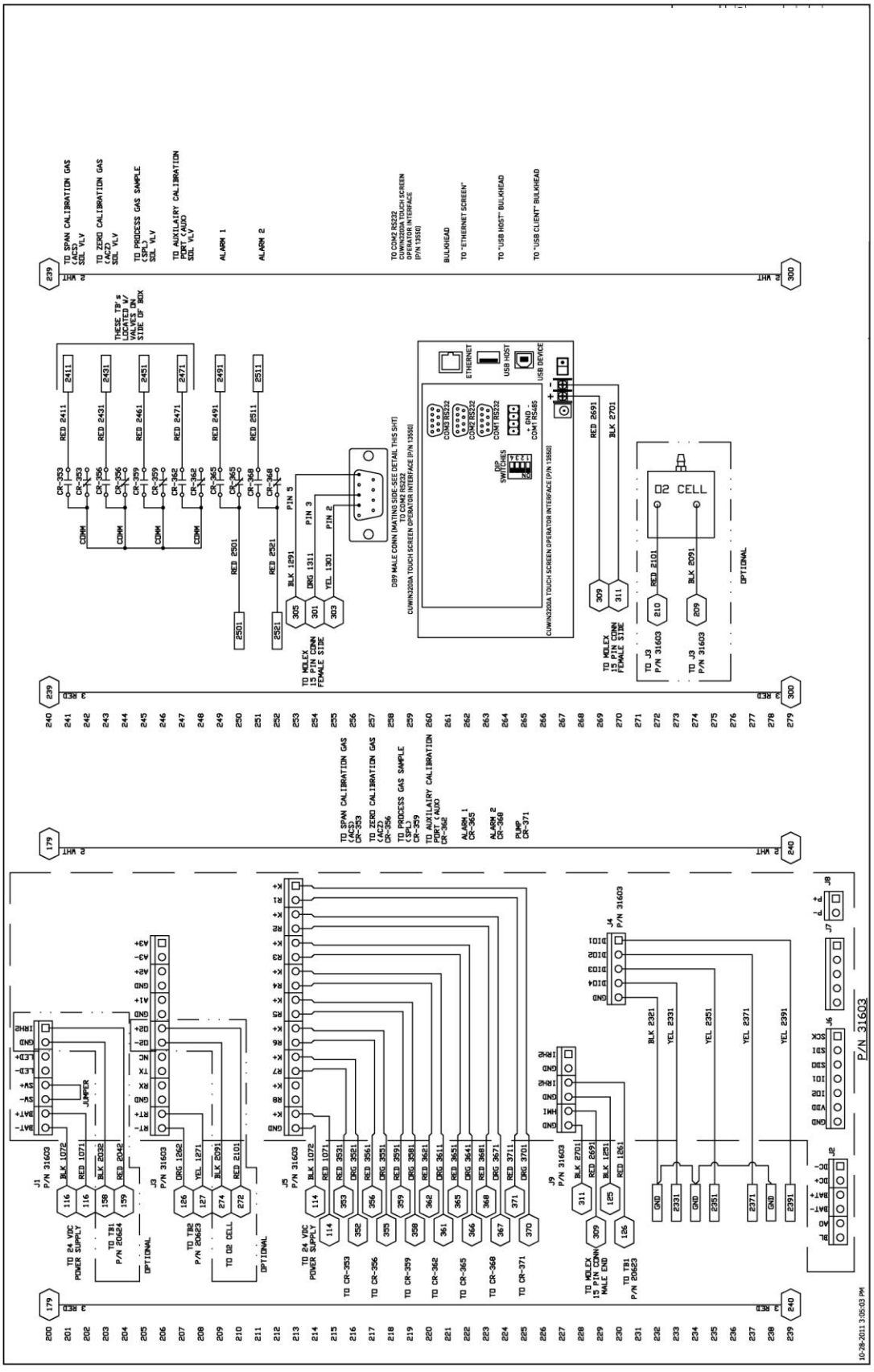
Shut Down User Interface

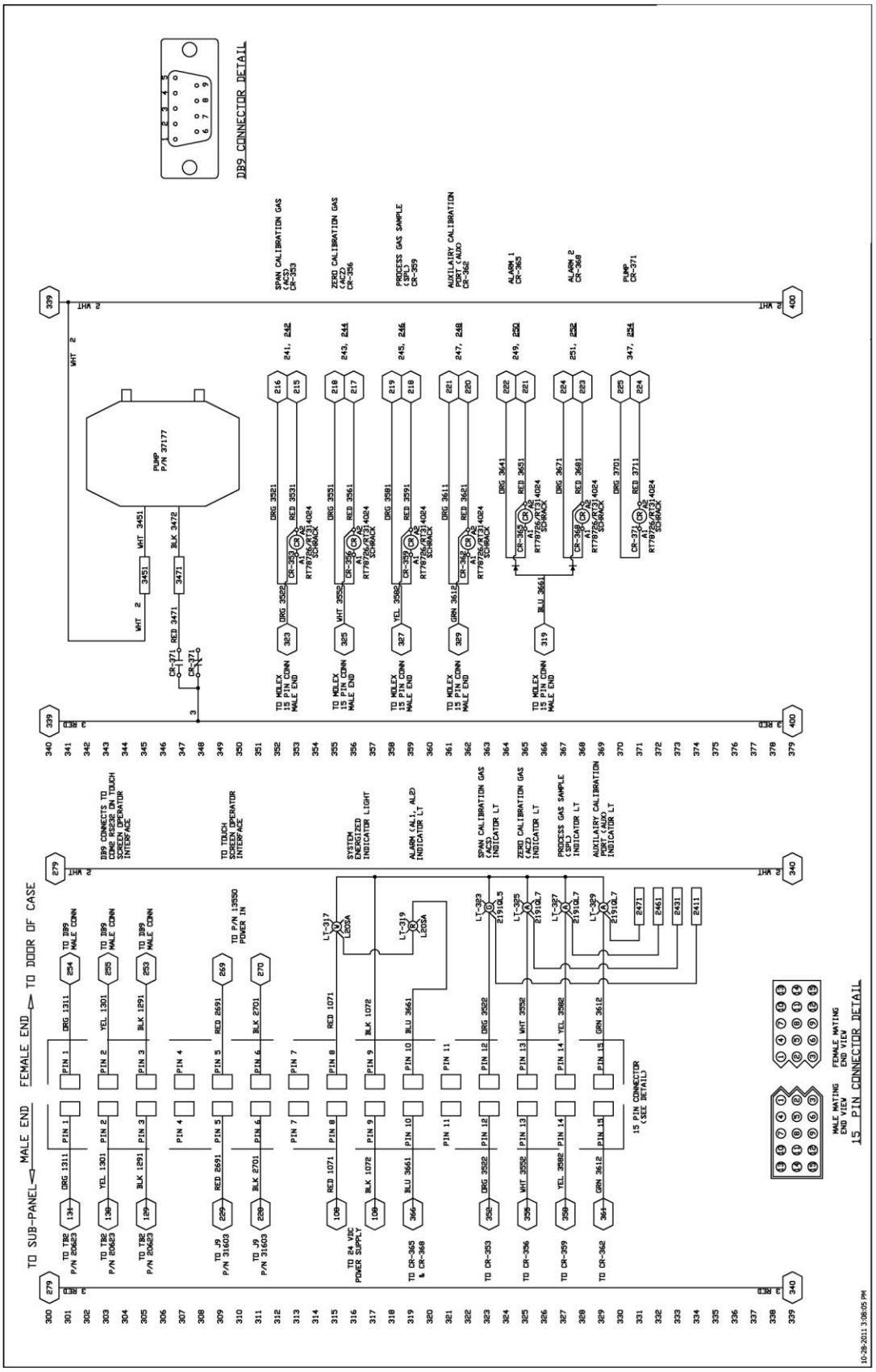


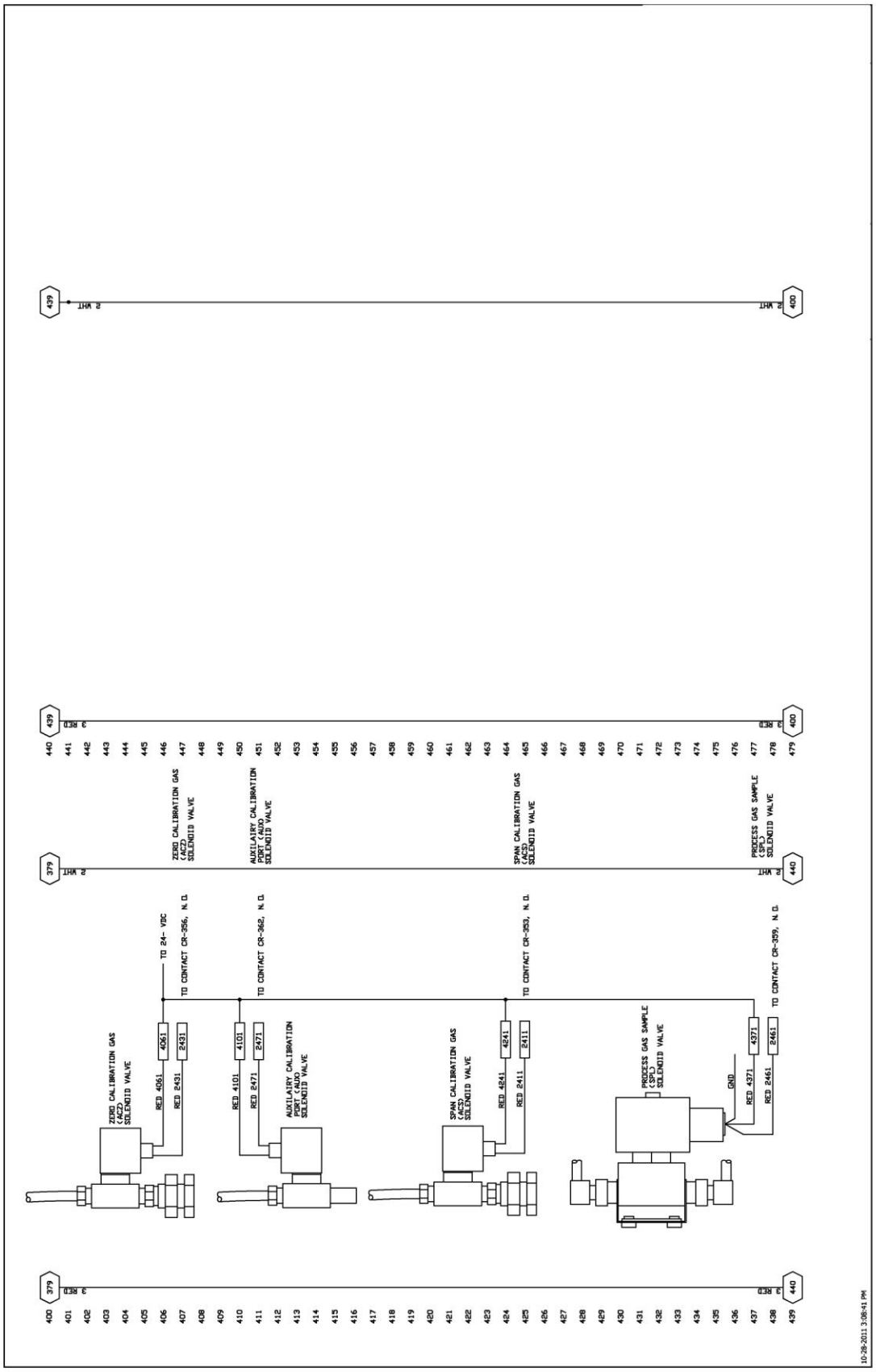
The Shutdown selection will display a screen asking whether or not you wish to shutdown the interface with the MGA.

Appendix A – Electrical Drawings




P/N 31603
TO SPAN CALIBRATION GAS (ACS) SOL VLV
TO ZERO CALIBRATION GAS (ACZ) SOL VLV
TO PROCESS GAS SAMPLE (SPL) SOL VLV
TO AUXILIARY CALIBRATION PORT (AUXO) SOL VLV
ALARM 1
ALARM 2
TO COM2 RS232 CUWIN3200A TOUCH SCREEN OPERATOR INTERFACE (P/N 13950)
BULKHEAD
TO "ETHERNET SCREEN"
TO "USB HOST" BULKHEAD
TO "USB CLIENT" BULKHEAD
THESE TB's LOCATED W/ VALVES ON SIDE OF BOX
D2 CELL
OPTIONAL
TO 24 VDC POWER SUPPLY
TO D2 CELL
TO CR-353
TO CR-356
TO CR-359
TO CR-362
TO CR-365
TO CR-368
TO CR-371
TO MOLEX 15 PIN CONN MALE END
TO MOLEX 15 PIN CONN FEMALE SIDE
JUMPER
10-28-2011 3:05:03 PM


TO SUB-PANEL
MALE END
FEMALE END
TO DOOR OF CASE
DB9 CONNECTOR DETAIL
15 PIN CONNECTOR DETAIL
MALE MATING END VIEW
FEMALE MATING END VIEW
PUMP P/N 37177
SPAN CALIBRATION GAS (SPAN) CR-353
ZERO CALIBRATION GAS (AUTO ZERO) CR-356
PROCESS GAS SAMPLE (SPL) CR-359
AUXILIARY CALIBRATION (SPAN 2/AUX) CR-362
ALARM 1 CR-365
ALARM 2 CR-368
PUMP CR-371
TO 24 VDC POWER SUPPLY
TO P/N 13550 POWER IN
SYSTEM ENERGIZED INDICATOR LIGHT
ALARM (AL), ALD INDICATOR LT
SPAN CALIBRATION GAS (SPAN) INDICATOR LT
ZERO CALIBRATION GAS (AUTO ZERO) INDICATOR LT
PROCESS GAS SAMPLE (SPL) INDICATOR LT
AUXILIARY CALIBRATION (SPAN 2/AUX) INDICATOR LT
TO TOUCH SCREEN OPERATOR INTERFACE
DB9 CONNECTS TO COM2 RS232 ON TOUCH SCREEN OPERATOR INTERFACE
10-28-2011 3:08:05 PM


ZERO CALIBRATION GAS (ACZ) SOLENOID VALVE
AUXILIARY CALIBRATION PORT (AUX) SOLENOID VALVE
SPAN CALIBRATION GAS (ACS) SOLENOID VALVE
PROCESS GAS SAMPLE (SPL) SOLENOID VALVE
TO 24+ VDC
TO CONTACT CR-356, N.O.
TO CONTACT CR-362, N.O.
TO CONTACT CR-353, N.O.
TO CONTACT CR-359, N.O.
RED 4061
RED 2431
RED 4101
RED 2471
RED 4241
RED 2411
RED 4371
RED 2461
GND
2 RED
2 WHT

Appendix B – Plumbing Connections